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ABSTRACT

This is a report produced by the Committee on Education and Human Resources (CEHR) of the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) to supplement President Clinton's Fiscal Year 1994 Budget request. It describes the progress of CEHR and FCCSET in developing a coordinated Federal strategy, consistent with the National Education Goals and the Goals 2000 strategy to improve science, mathematics, engineering, and technology education in this country. Some of the topics discussed are FCCSET/CEHR strategy, budget summaries, agency roles, strategic priorities, crosscutting issues, and future activities. This document is intended to serve as a comprehensive template for policy makers, educators, and the public. (ZWH)

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Investing in Our Future

Science, Mathematics, Engineering, and Technology Education

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Report of the FCCSET Committee on Education and Human Resources

FY 1994 Budget Summary

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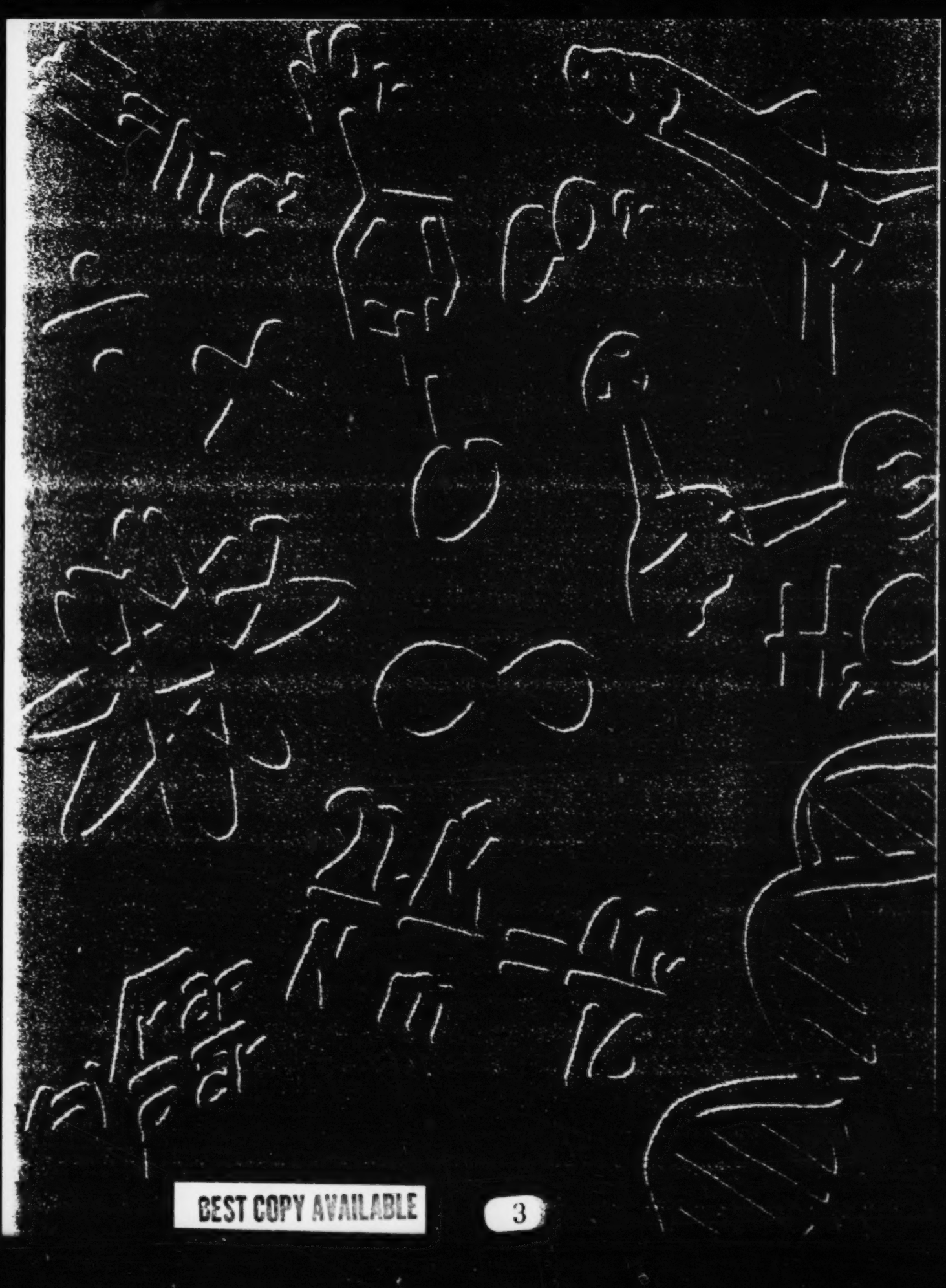

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Investing in Our Future

Science, Mathematics, Engineering, and Technology Education

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Report of the FCCSET Committee on Education and Human Resources

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Office of Science and Technology Policy

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FY 1994 Budget Summary

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20506

MEMBERS OF CONGRESS:

I am pleased to forward with this letter, "Investing in Our Future: Science, Mathematics, Engineering, and Technology Education," prepared by the Committee on Education and Human Resources (CEHR) of the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET), to supplement the President's Fiscal Year 1994 Budget.

President Clinton has a long history of support for a strong education program. As Governor, he was one of the leading participants in the 1989 Education Summit. As President, he has advanced proposals to address the National Education Goals, which were an outcome of the Education Summit.

This FCCSET report specifically addresses Federal actions to respond to the National Education Goals in the areas of science, mathematics, engineering, and technology education. Through the interagency FCCSET process, the programs of eleven departments and agencies have been coordinated to focus on a common set of goals and objectives. A strategic plan with milestones has been put into place. The CEHR has conducted a number of outreach activities to present this program to education leaders at national, state, and local levels.

A major redirection of the CEHR is underway and will be reflected in the activities directed toward the Fiscal Year 1995 budget and beyond. The CEHR is undergoing a transition to accommodate technology in all areas of education as well as training. The CEHR will continue its traditional support of science, mathematics, engineering, and technical education as it expands to include the rest of education and training. This redirection is supportive of the technology initiative announced by the President and the Vice President on February 22, 1993. The initiative supports the development and introduction of computer and communications equipment and software that can increase the productivity of learning in formal school settings, a variety of business training facilities, and in homes. The CEHR will ensure close coordination of this initiative with those of the FCCSET Initiative on High Performance Computing and Communications and the Network Information Infrastructure Task Force. The details of this redirection of the CEHR will be addressed later in a separate report.

I would like to thank Luther Williams, Acting CEHR Chair, Governor Madeleine Kunin, CEHR Co-Vice Chair, and their interagency committee members, associates, and staff who have worked diligently to develop and present the programs set forth in this report.

John H. Gibbons
Director

NATIONAL SCIENCE FOUNDATION
1800 G STREET, N.W.
WASHINGTON, D.C. 20550

Dr. John Gibbons
Assistant to the President
for Science and Technology
Director, Office of Science
and Technology Policy
The White House
Washington, DC 20500

Dear Jack:

I am proud to transmit, *Investing In Our Future–Science, Mathematics, Engineering, and Technology Education*, a report to supplement the President's FY 1994 Budget request, produced by the Committee on Education and Human Resources (CEHR) of the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET).

This document represents a paradigm shift–moving from an aggregation of multiple agency programs to an integrated, coordinated, and focused multi-year approach for managing and directing the Federal effort in science, mathematics, engineering, and technology education. Combined with the CEHR Strategic Plan, it provides a framework for making policy, programmatic, and budgetary decisions and for assessing the impact of those decisions. This document should serve as a comprehensive template for policy makers, educators, and the public.

I take great pride in what the Committee has achieved in a relatively short period of time. This report boldly states the President's commitment to science, mathematics, engineering, and technology education and lays the foundation for the Federal government's partnership with the public and private sectors in reaching the National Education Goals through the President's Goals 2000 strategy.

I look forward to working with you as we proceed to meet the important challenge of investing in our future.

Sincerely,

Luther S. Williams

Luther S. Williams
Acting Chairman, FCCSET CEHR

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Executive Summary

Education in the United States is a partnership effort involving Federal, State, and local governments; educators and parents; business and industry; professional associations; and community-based organizations. The Federal Government, as a customer and patron of a large segment of the Nation's scientific and technical work force, has a direct stake in the quality of science, mathematics, engineering, and technology education. Although Federal sources contribute only 6% of the total spending for elementary and secondary education, the Federal Government can play a leadership role by highlighting national challenges, mobilizing national support, and funding programs that offer unique national solutions.

This report, *Investing in Our Future*, describes the progress of the Committee on Education and Human Resources (CEHR) of the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) in developing a coordinated Federal strategy, consistent with the National Education Goals and the Goals 2000 strategy, to improve science, mathematics, engineering, and technology education in this country.

Through the efforts of 16 Federal departments, agencies, and institutions, CEHR has developed a 5-year strategic plan that outlines a planning framework and associated milestones that focus Federal planning and the resources of the participating agencies on achieving the requisite or expected level of mathematics and science competence by *all* students. The priority framework outlines the strategic objectives and priorities for funding Federal programs in science, mathematics, engineering, and technology education to meet the National Education Goals.

The President's Fiscal Year (FY)1994 budget proposes the investment of $2.33 billion in science, mathematics, engineering, and technology education programs. This represents an increase of 6.8% over the FY 1993 enacted funding level for these programs. The requested FY 1994 increases are consistent with the priorities established by CEHR to achieve the mathematics- and science-related National Education Goals. There are two categories of priorities:

1. **Strategic Implementation Priorities** that address the entire education continuum, i.e., kindergarten through adult. These priorities include elementary and secondary systemic reform, undergraduate revitalization, graduate education, public understanding of science, and technology education.

2. **Crosscutting Priorities** that apply to all stages of the education continuum including increasing the use of educational technologies; increasing participation of underrepresented groups; identification, dissemination and adoption of exemplary materials; educational partnerships; and evaluation.

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The FY 1994 request is distributed as follows:

Elementary and Secondary:	$848 million (+10% over FY 1993)
Undergraduate:	$475 million (+11% over FY 1993)
Graduate:	$943 million (+ 2% over FY 1993)
Public Understanding of Science:	$ 69 million (+ 4% over FY 1993)

Eleven agencies support programs in the FY 1994 budget; they are the Department of Agriculture, the Department of Commerce, the Department of Defense, the Department of Education, the Department of Energy, the Department of Health and Human Services, the Department of the Interior, the Environmental Protection Agency, the National Aeronautics and Space Administration, the National Science Foundation, and the Smithsonian Institution. The efforts of the agencies are concentrated at different educational levels, however, together they represent a holistic approach to mathematics and science education. These resources will allow the CEHR agencies to implement the first stages of a comprehensive strategy for the reform of mathematics and science education at all levels.

In addition to Federal budgetary support, other Federal resources are being applied to support educational improvement, including the Nation's vast network of Federal scientific laboratories, technical facilities, expert personnel, and the science- and mathematics-related information and materials that they produce. These Federal resources represent a unique asset with significant potential for contributing to the improvement of the basic science knowledge of teachers and students throughout this country.

The science, mathematics, engineering, and technology education initiative, as outlined in *Investing in Our Future* and championed by CEHR, provides a coordinated Federal strategy designed to help ensure U.S. world leadership in basic science, mathematics, engineering, and technology, to build a highly trained work force, and to increase public understanding of science. The linchpin to this endeavor is a unified Federal commitment to ensure that opportunities are available for people to acquire the skills they need to succeed, recognizing that, in today's world, education is a lifelong process.

Introduction

The National Education Goals, three of which deal specifically with mathematics and science, present the Nation with an ambitious and challenging framework intended to guide Federal, State, and local activities. Representing the first national consensus on the expected achievement of our educational system, these goals recognize that education is an investment in our future. They highlight the important role that education plays both in preparing individual citizens to lead productive lives and in benefiting the Nation as a whole.

Addressing the National Education Goals requires a comprehensive effort that leverages resources to build a State and local capacity for systemic reform. The Federal Coordinating Council for Science, Engineering, and Technology's Committee on Education and Human Resources (FCCSET/CEHR) provides the structure for an unprecedented opportunity to transform the Federal Government's role in improving education for *all* Americans. The partnership of the participating agencies is an opportunity to advance the National Education Goals, assist in the achievement of high standards resulting in high performance, and promote coherent systemic education reform across the country.

Giving focus to CEHR's efforts is the President's education strategy, "Goals 2000: Educate America Act," which is centered on systemic reform and which changes from an approach based on discrete programs to one that links programs within and across agencies. All of the reform efforts are centered around the Goals, requiring the linkage of programs and policies at the Federal, State, and local levels so that services address the need of the whole student and result in the acceleration of learning rather than remediation. The strategy, therefore, provides a context for the consideration of the reform of mathematics and science education.

However, within this more comprehensive strategy, there is a critical need to focus specifically on mathematics, science, engineering, and technology education. As the basis for technological and scientific advances, mathematics and science education have a direct tie to the economic competitiveness and well-being of our Nation. In addition, the mathematics and science education communities have already been very actively involved in reform; working in partnership with these communities, the Federal Government can apply its efforts as a foundation for more comprehensive reform. Mathematics and science education also presents a set of very specific challenges:

The National Education Goals

By the year 2000:

1. All children in America will start school ready to learn.
2. The high school graduation rate will increase to at least 90 percent.
3. American students will leave grades four, eight, and twelve having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy.
4. U.S. students will be first in the world in science and mathematics achievement.
5. Every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and resonsibilities of citizenship.
6. Every school in America will be free of drugs and violence and will offer a disciplined environment conducive to learning.

- In international comparisons, the United States ranks below most other developed nations.[1]

- By graduation from high school, less than half of all U.S. students have taken chemistry and only 20 percent have taken physics. Less than half of U.S. secondary school students

[1] *Learning Mathematics and Learning Science*. International Assessment of Educational Progress, 1992.

take second-year algebra, and only 9 percent take calculus.[2]

- Eighty-three percent of fourth graders have a teacher who has taken no more than one undergraduate course in mathematics. Only one percent of fourth-grade students have a teacher with a major in mathematics.[3]

- Each year, from high school through graduate school, one out of every two students enrolled in mathematics stops taking mathematics courses.[4]

- Women receive only one in five doctorates in mathematics.[5]

- Only 6.9 percent of adults are scientifically literate and only 13.3 percent have an understanding of scientific processes.[6]

These statistics are symptomatic of deficiencies in our educational system including low expectations for what students, particularly minorities, women, and individuals with disabilities, can achieve in mathematics and science; inadequate teacher education, both preservice and inservice; curricula at all levels that fail to challenge and attract students; the lack of institutional support for comprehensive reform; and a lack of interest nationwide in lifelong learning in mathematics and science.

Reference to these statistics and problems is not meant to serve as a portent of doom, but instead as the motivation to jolt us out of complacency. Meeting the challenges highlighted by the statistics and reaching our National Education Goals require an ambitious strategy. This strategy must recognize that a complete and equitable education is both a right and a necessity for all Americans. It must be designed to help all students realize their potential and must include ways of ensuring that all students, regardless of their backgrounds, have the necessary resources, support, and encouragement to achieve all they can. It must also utilize, in a coordinated manner, the unique strengths and abilities of all Federal agencies.

When the Federal Coordinating Council for Science, Engineering and Technology (FCCSET) established the Committee on Education and Human Resources (CEHR), it charged CEHR with the task of determining the Federal role in the improvement of mathematics and science education and developing a strategy for maximizing that role. Over the past year the FCCSET/CEHR developed a comprehensive 5-year strategy that represents a systemic approach to educational reform. This strategy not only builds on CEHR's past 3 years, but it also revises past activities to meet the President's educational strategies and goals.

[2] *State Indicators of Science and Mathematics Education, 1990.* Council of Chief State School Officers, 1990.

[3] *The State of Mathematics Achievement: NAEP's 1990 Assessment of the Nation and the Trial Assessment of the States.* National Center for Education Statistics, 1991.

[4] *Moving Beyond Myths: Revitalizing Undergraduate Mathematics.* National Research Council, 1991.

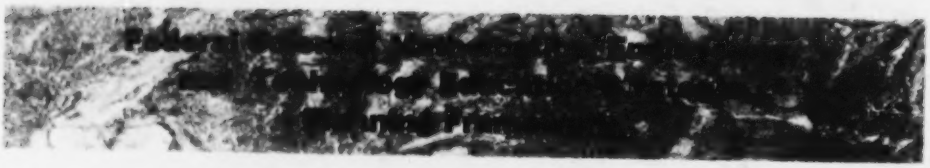
[5] Ibid.

[6] *The Public Understanding of Science and Technology in the United States, 1990.* Jon D. Miller, Northern Illinois University, 1991.

Background

The Committee on Education and Human Resources (CEHR) was established in 1990 by the White House Office of Science and Technology Policy (OSTP) and chartered under the Federal Coordinating Council for Science, Engineering and Technology (FCCSET). CEHR is charged with the development of a coordinated Federal strategy for mathematics and science education that will ensure U.S. world leadership in science and technology, build a highly trained workforce, and increase public understanding of science. Membership in CEHR includes Senior Administration officials from the following agencies:

Department of Agriculture (USDA)
Department of Commerce (DOC)
Department of Defense (DOD)



Strategic Objectives

- Improved science and mathematics performance
- Strong elementary and secondary teacher workforce
- Adequate pipeline for science and technology workforce, including greater participation of individuals underrepresented in science, mathematics, engineering, and technology education, e.g., women, minorities, and persons with disabilities
- Improved public science literacy

Implementation Priorities

Elementary and Secondary Education	***Undergraduate Education***	***Graduate Education***	***Public Understanding of Science***	***Technology Education***
• Standards for curriculum, teaching, and assessment • Materials (curriculum, course, and instructional) • Teacher enhancement • Teacher preparation • Systemic reform	• Materials (curriculum, course, and instructional) • Faculty development and enhancement	• Student support, incentives, and opportunities • Recruitment and retention of U.S. students • Foster multi-disciplinary/ applied research/ technology programs	• Standards for public science literacy • Increase public science literacy	• Curriculum reform • Teacher enhancement

Implementation Components

- Evaluation and assessment
- Dissemination and technical assistance
- Educational technologies

Figure 1

Department of Education (ED)
Department of Energy (DOE)
Department of Health and Human Services (HHS)
Department of Housing and Urban Development (HUD)
Department of the Interior (DOI)
Department of Justice (DOJ)
Department of Labor (DOL)
Department of Transportation (DOT)
Department of Veterans Affairs (VA)
Environmental Protection Agency (EPA)
National Aeronautics and Space Administration (NASA)
National Science Foundation (NSF)
The Smithsonian Institution (SI)
Office of Management and Budget (OMB)
Office of Science and Technology Policy (OSTP)
National Economic Council (NEC)

Through its member agencies, CEHR provides leadership in science, mathematics, engineering, and technology education by accomplishing the following:

- Identifying priorities for Federal initiatives designed to improve and maintain world-class science, mathematics, engineering, and technology education at all levels from kindergarten through adulthood.

- Encouraging Federal interagency cooperation and collaboration.

- Developing a program and budget plan that builds upon the unique educational strengths of each agency, while eliminating unnecessary or ineffective duplication of effort.

- Forging strong linkages between Federal agencies and individual States, colleges, universities, schools, school systems, and the private sector to promote excellence in science, mathematics, engineering, and technology education.

- Identifying and developing model education programs and disseminating successful models to the education community.

- Making the unparalleled scientific resources of the Federal Government, including laboratories, scientists, equipment, and materials, available to educators and students.

Since its inception, the work of the CEHR has evolved. Initially, the Committee identified a set of priorities in education as shown in the Federal Science, Engineering, and Mathematics Education Strategic Planning Framework (Figure 1). This Framework has been updated annually to reflect the current state of education reform and the role the Federal Government will play in it.

Each agency identified its programs that support mathematics and science education; these programs were presented in the President's FY 1992 Budget to the Congress, the first crosscutting Federal budget in mathematics and science education.

Accomplishments

For the first time, CEHR moved beyond the establishment of Federal priorities and a set of baseline data to the proposal of several interagency initiatives for FY 1993. Over the past year, CEHR accomplished the following:

- The *FCCSET Summer Teacher Enhancement Institutes*, an interagency pilot program that capitalizes on Federal resources, began in the summer of 1993. Four-week summer institutes were conducted to expose teachers to cutting-edge research in specific scientific and technical disciplines and to show them how to incorporate what they have learned into the classroom. Approximately 800 teachers received this intensive training at 16 Federal laboratories in Alabama, California, Colorado, the District of Columbia, Illinois, Louisiana, New Mexico, North Carolina, Ohio, South Carolina, Tennessee, Texas, Virginia, and Washington. Participating agencies include the Department of Energy (which leads the effort), the Department of Agriculture, the Department of Commerce, the Department of the Interior, the Environmental Protection Agency, the National Aeronautics and Space Administration, and the Smithsonian Institution.

- Through its Educational Technologies Working Group, CEHR, under the leadership of NASA and NSF, sponsored a *Workshop on the Applications of Telecommunications in Mathematics and Science Education* in April, 1992. The working group convened 13 experts to review the status of education-related telecommunications within the public and private sector. The workshop provided a forum for an open exchange of information among the 31 presenters, the expert panel, the audience, and the CEHR agencies. The expert panel's report to the Working Group summarized the activities currently supported and recommended that the Federal Government actively develop a national strategy for effective use of educational telecommunications.

- Under the leadership of the National Science Foundation, CEHR established an *Expert Panel on Evaluation*, composed of external experts in education, mathematics, and science. The panel's mission was to examine the scope and balance of Federal science, mathematics, engineering, and technology education programs at all levels across agencies and to advise CEHR on agencies' evaluation practices and future needs.

  The panel's report, with the following components, was submitted in Summer 1993: (1) a description of the science, mathematics, engineering, and technology programs sponsored by the Federal Government that identifies programmatic gaps and overlaps and areas of strength and weakness; (2) a description of the current level of program evaluation activity within and across agencies; (3) suggestions on how to improve program evaluation activities; and, (4) recommendations for future interagency cooperation.

- CEHR sponsored, under the leadership of the Department of Health and Human Services (HHS), an *Expert Forum on Public Understanding of Science* (PUNS) in August, 1992. Experts from outside the Federal Government were invited to discuss the meaning and dimensions of public understanding of science, strategies for achieving PUNS, and evaluation needs. The experts concluded that the Federal Government can play a critical role in improving public understanding of science—by acting as a catalyst, by providing long-term funding for successful programs, by encouraging collaboration, and by collecting and disseminating information about effective programs. Some experts will continue to meet with CEHR to help develop a consensus on the definition of PUNS, identify audiences, and deal with evaluation issues.

- *Executive Order 12821 "Improving Mathematics and Science Education in Support of the National Education Goals"* was issued November 16, 1992, to (1) encourage all Federal agencies with a mathematics and science mission to assist in mathematics and science education; and, (2) facilitate the transfer of Federal surplus mathematics and science equipment to elementary and secondary schools.

- *Guidebook to Excellence,* A Directory of Federal Facilities and Other Resources for Mathematics and Science Education Improvement. In January 1993, FCCSET/CEHR produced, for the first time, a State-by-State directory of Federal agency resources available for K-12 mathematics and science teachers. This directory lists educational contacts for several Federal agency offices and laboratories located in each State. Over 5,000 requests for the directory have been received from teachers and administrators, and the directory will be revised to include all CEHR agencies, expanded, and republished in FY 1994.

- Technology Education Working Group: The Technology Education Working Group established the foundation for the CEHR to begin addressing the technical education requirements of current and future workers. The group explored the possibility of modifying existing or creating new Federal initiatives to develop an infrastructure that will assist noncollege-bound high school students to acquire the technological/scientific skills necessary for long-term, meaningful employment in science-related occupations.

  The group also recommended the development of industry-based skill standards and portable credentials; the development of milestones for technical education in future editions of the Strategic Plan; promotion of public awareness among high school students and employers of the need for highly trained individuals in technical occupations; and the development of a structural link between secondary institutions, undergraduate institutions, and the technical education sector.

- *Pathways to Excellence: A Federal Strategy for Science, Mathematics, Engineering and Technology Education.* In FY 1992-1993, FCCSET/CEHR produced the first 5-year (FY 1994-1998) Strategic Plan. This Plan provides the template to focus Federal planning and resources toward achieving the requisite or expected level of mathematics and science competency by all students. This document represents a paradigm shift in the way the Federal Government manages its mathematics and science education programs. Over 19,000 copies of the Plan have been distributed throughout the country to a diverse group of people (educators, parents, associations, the Congress, etc.), and the response has been favorable. The Plan will be updated annually to reflect the current state of Federal planning activities and the progress on the previous year's stated objectives and milestones.

Building on the Past and Looking to the Future: A 5-Year Strategy for CEHR in 1993 and Beyond

Although the activities undertaken in previous years form a solid foundation upon which to build, a changing focus is required for CEHR in 1993 and beyond. Consistent with the philosophies underlying the President's approach to broad-based educational reform, CEHR proposes to take a more systemic approach in its endeavors. This approach will center on the effective linking and coordination of resources at the Federal, State, and local levels and will promote the building of State and local capacity for education reform. In support of this approach, CEHR has developed a strategy to guide Federal investment in mathematics and science education over the next 5 years. The strategy sets long-term goals and establishes milestones that will measure progress toward those goals.

Pathways to Excellence: A Federal Strategy for Science, Mathematics, Engineering, and Technology Education is based on several assumptions:

1. All men, women, and children can and should learn mathematics and science.

2. Knowledge of mathematics and science is necessary to the well-being of our Nation as a whole and of its citizens individually.

3. Education is a continuum that runs throughout one's life. True educational reform requires a concerted effort at all levels of education—elementary and secondary, undergraduate, graduate, and lifelong learning.

4. Education is a collaborative effort that requires the involvement of all sectors of society. The Federal Government can play a leadership role in mathematics and science education through supporting initiatives designed to improve and maintain world-class mathematics and science education at all levels, forging partnerships, and developing model programs and exemplary materials and encouraging their implementation. However, other sectors must participate as well.

5. Federal efforts should be designed to foster the development of the capacity for educational reform in States, schools, and districts.

Founded on these assumptions, the Strategic Plan focuses on areas of high priority in the reform of mathematics and science education. *It builds on and enhances current Federal efforts in mathematics and science education.* Some of these current efforts contribute to the milestones identified in the Strategy, while others, called the "base investment" throughout this report, form the foundation on which the milestones are built. The Plan also serves as a template to maximize the impact of this base investment.

The FY 1994 Federal Priority Framework (Figure 2) outlines the priorities CEHR identified at each level. A more in-depth discussion of the Strategic Plan, including its milestones and their implementation, is found in the budget proposal section.

Strategic Plan Themes

The Strategic Plan endorses a wide range of existing Federal activities, including continued support for student incentives and opportunities, systemic reform programs, research-related teacher enhancement (professional development), educational technologies, development of course and instructional materials, and public understanding of science. Of special interest are programs to advance graduate education and to increase the participation of groups underrepresented in mathematics and science at all levels. The Plan places priority on the improvement of education at five levels: elementary and secondary, undergraduate, graduate, public understanding of science, and technology education. It also identifies crosscutting issues that affect all levels of education and that merit special attention.

Base Program

- Maintain and capitalize on current world-class programs (e.g., graduate education, student incentives and opportunities, educational technology) and opportunities for groups underrepresented in mathematics and science (e.g., women, minorities, and persons with disabilities)

Tier I Priorities: Reforming the Formal Education System

Elementary and Secondary: Systemic Reform

- Curriculum, teaching, and assessment standards: development and implementation
- State curriculum frameworks: development and implementation
- Curriculum, course, and instructional materials: development and implementation
- Teacher enhancement and preparation

Undergraduate: Revitalization

- Curriculum, course, and instructional materials: development and implementation (lower-division)
- Undergraduate faculty enhancement

All Education Levels: Evaluation

- Evaluation of Federal agency programs

Tier II Priorities: Expanding Participation and Access

- Increase participation of groups underrepresented in science, mathematics, engineering, and technology: all education levels
- Identify, disseminate, and promote adoption of exemplary program strategies and materials: all education levels
- Identify Federal strategies to employ educational technologies more broadly

Tier III Priorities: Enabling Activities

- Increase public understanding of science
- Promote formation and strengthening of partnerships between 2-year institutions and other sectors

Figure 2

Strategic Priorities

- **Elementary and Secondary Systemic Reform.** The CEHR strategy supports standards-based systemic reform at the elementary and secondary level through a variety of complementary efforts that address the vital components of elementary and secondary education: the development and implementation of a voluntary system of national standards in science and mathematics; the development and administration of assessments to measure U.S. students' progress relative to the standards; the development of curricula that reflect the standards; and, intensive inservice and preservice training for teachers to develop the knowledge and skills needed to help students to attain the standards.

- **Undergraduate Revitalization.** Efforts at this level support the reform and revitalization of undergraduate education, especially at the lower division (freshman and sophomore) level. In particular, CEHR supports the revision and updating of lower-division curricula and providing undergraduate teaching faculty with research experiences.

- **Graduate Education.** The CEHR Strategic Plan recognizes the importance of maintaining the United States' preeminence in graduate education. Therefore, continued financial assistance to graduate students is proposed.

- **Public Understanding of Science.** Continuing education plays a vital role in ensuring that adults are able to make informed decisions on issues of national importance such as health care, the environment, and technology. The strategy calls for the development of standards for public science literacy to guide this effort.

- **Technology Education.** This area has been targeted as a top priority for 1993 and 1994. CEHR and the Committee on Industry and Technology (CIT) will focus their efforts on technical and worker training. The Committee will support efforts to improve the school-to-work transition and to ensure that all workers receive the training necessary to keep pace with a rapidly changing economy.

Crosscutting Priorities

- **Increasing the Use of Educational Technologies.** In support of the President's commitment to make school a high-performance workplace, the CEHR strategy places a high priority on increasing and maximizing the use of educational technologies. In 1993 and 1994, CEHR will develop a national vision for the Federal investment in educational technologies related to science and mathematics education.

- **Increasing Participation of Underrepresented Groups.** Recognizing that one of our Nation's strengths lies in its diversity, the CEHR will develop a strategy to increase the impact of resources focused on increasing the participation of groups historically underrepresented and underserved in mathematics and science education.

- **Identification, Dissemination, and Adoption of Exemplary Material.** The CEHR Strategic Plan provides for the improvement and coordination of Federal dissemination efforts and fosters the use of technology, e.g. INTERNET and NREN, in those efforts.

- **Educational Partnerships.** In the spirit of the President's envisioned partnership between Government and industry, the CEHR Strategic Plan encourages the development of partnerships between 2-year colleges and other sectors, including high schools, 4-year colleges and universities, and the private sector.

- **Evaluation.** The CEHR strategy focuses on program evaluation to ensure program accountability and to strengthen programs.

To achieve the goals and milestones of the Strategic Plan, CEHR will continue to guide the Federal Government's Science, Mathematics, Engineering, and Technology Education (SMETE) program through the SMETE Subcommittee. Under the Subcommittee, working groups are assigned to each priority area. This process is depicted in Appendix 1, which shows the organizational structure of the FCCSET/CEHR and the SMETE Subcommmittee Working Groups. Appendix 2 lists the working groups charged with implementing the specific areas of the Plan and the agencies that chair these groups.

The Plan recognizes that any 5-year strategy must be periodically evaluated and updated to accommodate changing circumstances. Therefore, this Plan will be reviewed annually and revised to incorporate changing needs and to reflect accomplishments.

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FCCSET Budget

The President's Fiscal Year (FY) 1994 budget proposes the investment of $2.33 billion in science, mathematics, engineering, and technology education programs. This represents an increase of 6.7 percent over the FY 1993 enacted funding level of these programs. The FCCSET/CEHR budget represents an integrated approach to funding and policymaking for Federal mathematics and science education programs. Using the Strategic Plan as a foundation, the CEHR budget provides the resources necessary to accomplish the goals and milestones in FY 1994. The budget also optimizes the use of current resources by retargeting or redesigning programs where necessary to make them more effective.

FY 1994 Budget Request by Agency and Major Program Area (Dollars in thousands)

Education Level	Total	USDA	DOC	DOD	ED	DOE	HHS	DOI	EPA	NASA	NSF	SI
Total	$ 2,334,237	24,041	6,200	539,395	355,939	128,499	464,108	90,013	9,855	84,251	621,880	10,057
Elem & Sec	$ 847,506	723	0	26,135	343,649	45,409	26,977	23,446	7,945	19,146	353,360	717
Undergraduate	$ 474,641	15,263	0	144,660	11,940	58,428	33,282	7,822	910	28,057	174,150	129
Graduate	$ 942,989	8,055	6,200	368,601	0	19,111	401,768	12,370	1,000	37,048	88,340	496
Public Understanding	$ 69,102	0	0	0	350	5,551	2,081	46,375	0	0	6,030	8,715

Figure 3

The FY 1994 CEHR budget presentation that follows addresses:

- Definitions and assumptions upon which the budget is based.
- Individual agency roles, noting the strengths that each agency brings to both the overall process and the strategy, including highlights of agency activities in FY 1993 and FY 1994.
- Crosscutting budget proposal, organized according to FCCSET/CEHR priorities.

For each priority, a description of the relevant Strategic Plan goals is included, as well as the base investment and milestones that contribute to those goals. Each discussion identifies the agencies active in the base investment and those responsible for achieving the milestones, the resources necessary to achieve the milestones, and the impact of those resources, as well as any legislative or programmatic issues that must be resolved.

The budget proposal concludes by identifying future directions for CEHR and activities being undertaken in 1993.

FY 1994 Request by Education Level

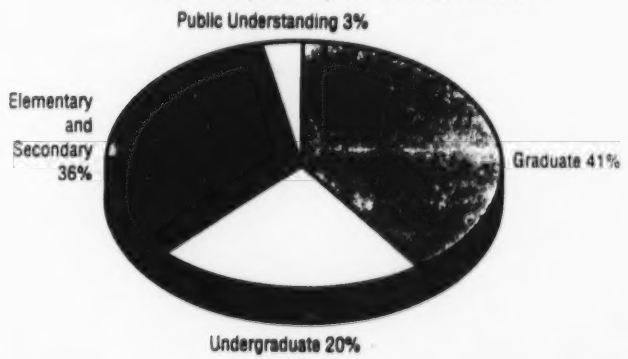

Figure 4

Background, Definitions, and Assumptions

The FCCSET/CEHR budget represents the Federal Government's investment in programs specifically designed to improve mathematics and science education. In order to increase the utility and impact of the crosscut, the CEHR decided to include only those programs that are expressly managed or funded as mathematics and science education programs. These are known as **Category 1 programs.** Excluded from consideration are research programs that contribute to science education (**Category 2**) and programs that support some mathematics and science issues within a broader context (**Category 3**) such as general education or health education programs. These definitions, as well as the budget priorities, are described more completely in Appendix 3.

The Committee believes that inclusion of only Category 1 programs remains appropriate because the impact of the Federal investment in science and mathematics education can only be directly affected by incremental changes in funding levels for these programs. Nevertheless, the omission of other programs from the crosscut should not be taken as an indication of their lack of importance to the overall Federal mathematics and science education effort. Moreover, the resources that Category 2 and 3 programs contribute toward mathematics and science education are substantial. For example, DOD estimates that its total spending on mathematics and science education exceeds $1 billion; however, its Category 1 programs are less than half of that amount. As another example, the Department of Education's (ED) Category 1 programs are currently funded at $341 million, while recent studies of ED's Federal student financial aid programs indicate that undergraduate and graduate mathematics and science majors are receiving over $3 billion in Federal aid.

CEHR developed definitions to differentiate the following two major areas of activity.

- **Base investment**—Ongoing, current programs needed to achieve the National Education Goals, Goals 2000, and the goals of the Strategic Plan. These programs constitute the framework upon which the Plan's milestones are built.

- **Strategic Plan milestones**—Specific activities that must be undertaken to achieve the goals (cited above) and the objectives identified in the Plan, as well as the programs and funding that support these activities.

In its deliberations, CEHR used the Strategic Plan as a framework to establish budget priorities. The first priority in allocating new resources is achieving the milestones in the Strategic Plan. In cases where CEHR found it advisable, base investment resources were reallocated to focus on the milestones. In the same way, additional new resources were applied to support and expand the base investment when it was determined appropriate.

Agency Roles

Sixteen Federal agencies participated in the FCCSET/CEHR Strategic and Budget planning processes. Eleven agencies invest in Category 1 mathematics and science education programs. The FY 1994 budget presents an integrated plan for allocating the resources of these 11 agencies, capitalizing on their strengths both individually and collaboratively.

Each agency brings a unique capability to formulating Federal policy in mathematics and science education through the FCCSET/CEHR process and strategy. For example, the Department of Education (ED) and the National Science Foundation (NSF) bring to this initiative an

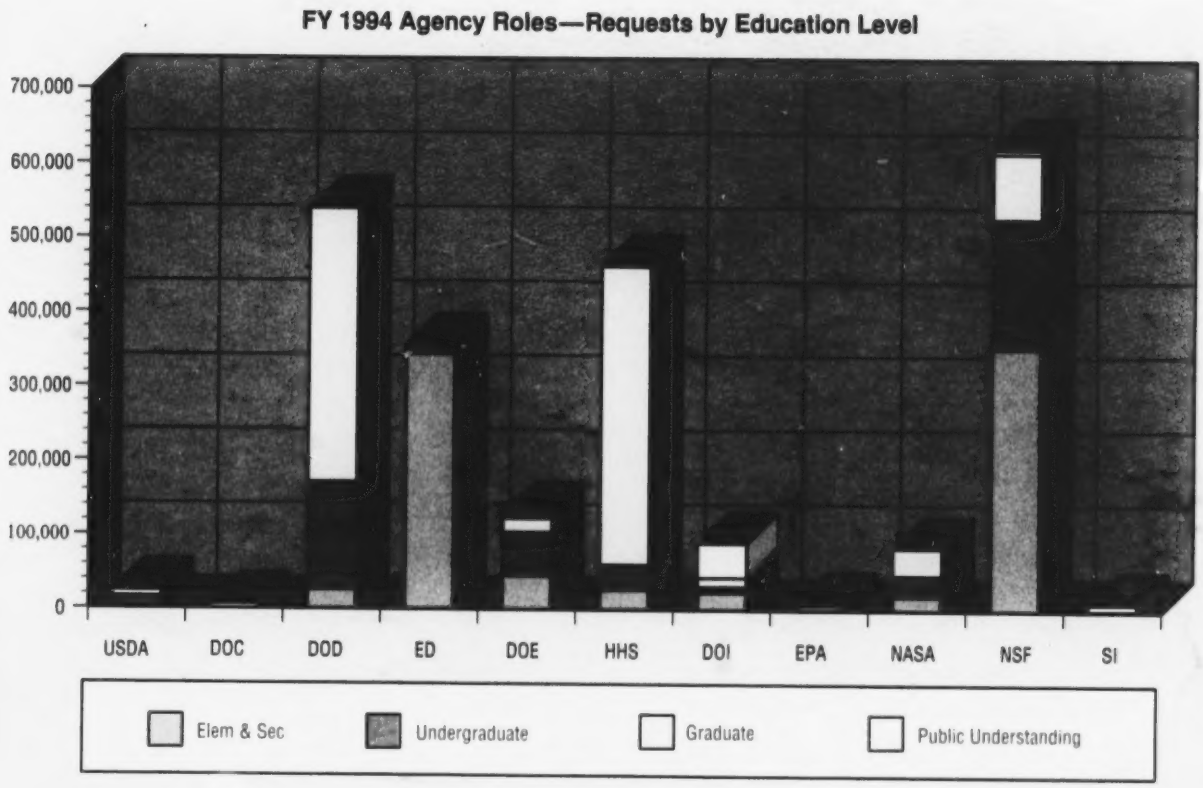

Figure 5

in-depth knowledge and expertise with mathematics and science education issues. They apply this knowledge by advising the mission agencies on the development of education programs in order to capitalize on the substantial Federal resources available, including Federal laboratories, national parks, and museums. The mission agencies bring expertise to bear on the Nation's needs for specific types of knowledge in specific scientific and technical subjects. This knowledge helps ED and NSF to ensure that the scientific information presented in their programs is accurate and up to date. The mission agencies also bring another important resource to the FCCSET/CEHR process in the form of the many world-class research scientists, mathematicians, and engineers associated with these agencies. These professionals provide an important resource as role models, mentors and content experts for a wide variety of educational initiatives.

The efforts of each agency are concentrated at different educational levels and together represent a holistic approach to mathematics and science education. Although the budget figures of several agencies (DOJ, DOL, DOT, HUD, VA) are not included in this budget summary, their programs provide indirect contributions to the Plan. Their efforts in FY 1993 and FY 1994 are described below, along with highlights of specific activities for the other 11 agencies.

Department of Agriculture: With a serious commitment to advancing minority participation in the food and agricultural sciences, the Department of Agriculture (USDA) has 1) more than doubled funding for the 1890 Institution Teaching and Research Capacity Building Grants Program since it was launched in FY 1990, 2) continued to support the Research Apprenticeship Program which promotes hands-on science experiences for high

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school minority youth, and 3) will initiate a Minority Scholars Program for undergraduates in FY 1994. USDA stimulates undergraduate curricula revitalization and faculty development in the food and agricultural sciences through its Higher Education Challenge Grants Program, as well as through the 1890 Capacity Building Program. In support of the base program, USDA has funded the National Needs Graduate Fellowships program. Further, to provide urban and rural youth with science-based learning experiences outside the classroom, the Department continues its strong support for the 4-H Program, which reaches some 5.6 million young people annually.

Department of Commerce: The Department of Commerce (DOC) supports the base investment through its graduate education programs, the Sea Grant Federal Fellows—Dean John A. Knauss Marine Policy Fellowships program and the National Institute of Standards and Technology (NIST)/National Research Council Postdoctoral Research Associateships Program. The Sea Grant Fellows program provides onsite educational experiences in the policies and processes of the Federal Government to 20 graduate students in marine science fields. The Research Associateships program provides 60 young scientists and engineers with the opportunity to engage in research in association with NIST senior research specialists.

Department of Defense: The Department of Defense (DOD) science and mathematics education program strongly supports the new national initiative to regain America's leadership in basic science, mathematics, and engineering and is closely aligned with the FCCSET/CEHR plans for revitalization of U.S. Science, Mathematics, Engineering, and Technology Education. The program is also a means to strengthen our competitiveness in world markets. Elements of the programs span the range from primary school through the postdoctoral levels and continuing education and training, with specific programs and general affirmative policy for increasing participation of persons with disabilities, minorities, and women. The DOD program is diverse and comprehensive and includes support for high school apprenticeships, science and engineering apprenticeships, fellowships for Historically Black Colleges and Universities and Minority Institutions, the National Defense Science and Engineering Graduate Fellowship, science fairs, adopt-a-school projects, Augmentation Awards for Science and Engineering Research Traineeships, Manufacturing Engineering Education, and the Experimental Program to Stimulate Competition in Research (EPSCoR).

Department of Education: Building on the principles expressed in the President's "Goals 2000: Educate America Act," the Department of Education's (ED) programs support standards-based systemic reform at the elementary and secondary level. Through the pending reauthorization of its elementary and secondary education programs, ED will try to increase the impact of each of these programs, link them with other Departmental efforts, and strengthen the programs' contributions to systemic reform, especially through adherence to Goals 2000.

For FY 1994, ED's budget makes a significant commitment to the CEHR base investment and many of the milestones. ED is currently funding the development of content standards in science. Progress toward achievement of National Education Goal #4, first in the world in mathematics and science by the year 2000, will be measured through the National Assessment of Educational Progress and the Third International Mathematics and Science Study, both of which are funded by ED. To encourage the implementation of high standards at the State and local levels, ED is sponsoring, through the Eisenhower National Program, the development of State curriculum frameworks in mathematics and science, as

well as the development of criteria for teacher certification and recertification, and teacher professional development programs. ED contributes to the milestone on teacher enhancement through part of the Eisenhower State Grant program and its Bilingual Educational Personnel Training program.

ED's support for the base investment focuses mainly on encouraging the participation and achievement of underrepresented groups. At the elementary and secondary level, these efforts include the Math/Science Centers in the Upward Bound program, which provide services that facilitate the transition to college for economically disadvantaged students, and the Bilingual Education mathematics and science competition aimed at increasing the achievement of limited English-proficient students. At the undergraduate level, ED funds comprehensive programs to improve the science programs at minority institutions and provides scholarships to outstanding students in the sciences.

Department of Energy: The Department of Energy (DOE) supports mathematics and science education programs at all levels of education—elementary and secondary through postgraduate. In FY 1994, DOE will continue to emphasize using the scientific and technical resources of DOE's National Laboratories to assist in science education reform. Opportunities will be provided for K-12 mathematics and science teachers and students to participate in summer research and learning experiences at DOE's laboratories. Similar opportunities will be available for undergraduate and graduate students, postdoctoral researchers, and faculty members. DOE is leading the interagency effort in which K-12 teachers will participate in intensive 4-week summer institutes in Federal laboratories on a variety of scientific and technical subjects. The DOE laboratories will also provide assistance to systemic reform efforts at the school and State levels. Public understanding of science efforts will be supported, through public and instructional television, science museums and centers, and public and community organizations.

Department of Health and Human Services: The Department of Health and Human Services (HHS) contributes to several of the Strategic Plan milestones, providing support in the areas of teacher enhancement, faculty and student research experiences, evaluation, educational partnerships, and public understanding of science. In FY 1993 and 1994, HHS is focusing special attention on the critical areas of preservice teacher training and bridging programs for students making the transition from 2-year colleges to 4-year institutions.

HHS will also continue its strong support for graduate education through programs like the prestigious National Research Service Awards (NRSA). These awards provide research training in the life sciences for almost 14,000 students each year. In all of its efforts, HHS will continue to emphasize activities that encourage members of underrepresented minorities, women, and persons with disabilities to pursue careers in the life sciences.

Department of the Interior: In FY 1994, the Department of the Interior (DOI) will continue its efforts to promote public understanding of natural resources science and support and encourage students to pursue degrees and careers in the sciences, in accordance with the National Education Goals. DOI's mathematics and science education programs span the range of education levels—K-12 to postgraduate. DOI also commits substantial resources to programs and activities designed to increase public science literacy. In terms of funding, the National Park Service (NPS) and the Fish and Wildlife Service (FWS) are the Department's major sponsors of mathematics and science education programs. However, nearly all DOI bureaus conduct a variety of informal and formal mathematics and science

education programs.

A major goal of the NPS and FWS is improving students' and the general public's understanding of the environment and fish and wildlife management issues. These efforts are conducted through park and refuge visits, teacher workshops, and classroom lectures.

Environmental Protection Agency: The Environmental Protection Agency (EPA) believes that environmental education is a necessary ingredient for environmental awareness and can also be an effective vehicle for teachers and others to advance educational reform. As a result, EPA will make an important contribution to the base investment and some of the milestones in the Strategic Plan. This will be accomplished by training educators through the National Consortium for Environmental Education and Training, awarding Environmental Education grants, encouraging environmental careers through the National Network for Environmental Management Studies and the Office of Environmental Equity, and through a variety of programs targeted at youth. In addition, EPA will participate in the FCCSET/CEHR Federal Laboratory Summer Teacher Enhancement Institutes in 1993.

EPA also places a strong emphasis on reaching out to underrepresented groups. These programs include Minority Academic Institutions Graduate Assistance Programs, the Progression Education Program, the Minority Institutions Student Fellowships, and the Minority Institutions Summer Intern Program.

National Aeronautics and Space Administration: The National Aeronautics and Space Administration's (NASA) education vision is to promote excellence in America's education system through enhancing and expanding scientific and technological competence. Under the direction of *"NASA's Strategic Plan for Education, A Strategy for Change: 1993-1998,"* NASA has begun a number of initiatives that directly support the National Education Goals, the FCCSET/CEHR implementation priorities, and the emerging national education standards. In FY 1994, NASA will: 1) continue to review and maintain its core program, 2) initiate new education reform initiatives, and 3) expand the development of partnerships with key external national constituencies. NASA's highest education priority is elementary and secondary teacher enhancement activities, supporting the implementation of the National Council of Teachers of Mathematics (NCTM) mathematics standards and the development of the NRC science standards. NASA's nine field centers/laboratories are the primary focus of teacher enhancement activity and are also developing partnerships with NSF's Statewide Systemic Initiative programs. The FY 1994 budget request reflects an increase of approximately 5 percent from FY 1993.

National Science Foundation: The NSF has a congressionally mandated responsibility for science, mathematics, and engineering education—fostering connections among institutions, disseminating knowledge, and bringing together the education and research communities.

NSF is active at all levels of education—elementary, secondary, undergraduate, graduate, postgraduate, and public understanding of science. It provides leadership through the CEHR, playing a strong role in such strategic areas as systemic reform, teacher preparation, both teacher and faculty enhancement, curriculum development, evaluation, and comprehensive programs (including those for minorities, women, and persons with disabilities). NSF's elementary and secondary efforts focus on teacher preparation and enhancement, improved instructional materials for science in the secondary schools, informal science education for children, student incentives, and major systemic reform.

Support for undergraduate education addresses the full spectrum of activities including

curriculum development, instrumentation and laboratory improvement at 2-year and 4-year institutions, and research experiences for both undergraduate students and faculty. At the graduate and postdoctoral levels, NSF supports graduate fellowships, predoctoral traineeships, and postdoctoral fellowships. NSF's public understanding of science activities include programs for decision makers and media programming to improve adult science literacy. A focus of the FY 1994 request is on activities directed at strategic points in the educational sequence with a primary goal of attracting and retaining students from populations historically underrepresented in the sciences.

Smithsonian Institution: In FY 1994, the Smithsonian Institution (SI) will continue to fund a variety of programs that support science education at the elementary, secondary, undergraduate, and post-graduate levels. In addition, many exhibitions, publications, and programs seek to increase public understanding of science. For example, many exhibitions conducted by SI museums and the National Zoological Park are complemented by programs that share with the public the Smithsonian's work in science. The SI also develops curriculum materials and works with teachers to encourage hands-on science teaching in elementary and secondary schools. Each year, thousands of school children participate in SI science programs. At the graduate and post-graduate levels, interns and fellows work with curators and other experts to further our understanding of the world in which we live. In all of its efforts, the SI is especially concerned with advancing the participation of minorities and women.

Although the following five agencies do not currently support any Category 1 programs, many of their programs do provide indirect support for the Strategic Plan's goals and milestones. It is anticipated that these programs will assume an increasingly significant role as CEHR expands its efforts in technology education.

Department of Justice: The Department of Justice (DOJ) supports the base investment, particularly the goals pertaining to adult literacy, lifelong learning, and high school completion. For example, the Bureau of Prisons continues to allocate substantial resources to its inmate education programs designed to address specific needs among inmates, including basic literacy, high school equivalency, and continuing education.

Department of Labor: The Department of Labor's (DOL) activities address the systemic reform of secondary education systems, revitalization of lower-division undergraduate education, and evaluation of education programs at all levels. For example, as a way to motivate youth to achieve higher skill levels and stay in school, DOL is exploring different approaches for school-to-work transition, including youth apprenticeship within the mainstream educational system. This work-based learning approach offers academic instruction, structured job training, worksite learning, and work experience.

Department of Transportation: In FY 1994, the Department of Transportation (DOT) will promote public understanding of science and support science and mathematics education programs at all educational levels to increase interest in transportation careers. The Federal Aviation Administration (FAA) supports a range of aviation education programs to inform and prepare secondary and undergraduate students for professional and technical careers in aviation. In partnership with over 50 accredited colleges and universities, the FAA Airway Science Program supports curriculum for both 2-year and 4-year degree

programs to prepare individuals for the aviation industry work force. In addition, DOT's University Transportation Centers Program provides training and research opportunities at 13 centers to prepare future transportation leaders and advance U.S. technology and expertise in transportation disciplines.

Department of Housing and Urban Development: The Department of Housing and Urban Development (HUD) has a variety of policies and programs to support the National Education Goals. These programs and activities focus on the special populations served by HUD, particularly low-income families receiving housing assistance, families in public housing, and minorities. HUD sponsors efforts to help low-income families acquire the education and job skills needed to move from dependency to employment and self-sufficiency. HUD is also working with housing authorities and public housing residents across the Nation to form public-private partnerships to help residents develop literacy and job skills.

Department of Veterans Affairs: The Department of Veterans Affairs (VA) maintains its commitment to programs at the secondary, undergraduate, and graduate levels to help ensure an adequate supply of health-care personnel for the Nation. In FY 1994, approximately 100,000 students will receive some or all of their clinical training in VA facilities affiliated with over 1,000 educational institutions. VA supports post-residency training and fellowships in medicine and dentistry, as well as graduate, pre- and post-doctoral training and fellowships in associated health professions. Cooperative education and Job Corps ventures will enable secondary and post-secondary students to be exposed to or trained in health-care occupations at selected VA medical centers.

VA's research and development program addresses biomedical, health services, and rehabilitative research issues while extending training and career development opportunities to new clinical investigators. VA also provides continuing education to a health-care workforce of 200,000 through its regional education centers and via a live, interactive satellite system that reaches VA practitioners and their community counterparts throughout the Nation.

Strategic Priorities

Elementary and Secondary Education: Systemic Change

Looking at mathematics and science education within the context of broader educational reform, the CEHR strategy follows the principles espoused by the President in his "Goals 2000: Educate America Act." CEHR's approach to the reform of elementary and secondary education involves standards-based systemic reform. The strategy proposes to reform the system by simultaneously addressing all elements of formal education. The base Federal investment in these areas would be strengthened, while specific priorities are emphasized. To make progress toward systemic change, a total of $848 million is requested for FY 1994, a 10.1 percent increase over the FY 1993 appropriation.

The resources required for both the base investment and the milestones, as well as the contributing agencies and the impact of the resources, are described below.

Elementary and Secondary Growth: FY 1993-1994
(Dollars in thousands)

Category	FY 1993	FY 1994	Increase
Total	$769,616	$847,506	10.1%
Standards/Assessments	19,480	29,961	53.8%
Teacher Preparation/Enhancemt.	395,333	419,988	6.2%
Curriculum Improvement/Equip.	54,787	61,071	11.5%
Organizational/Systemic Reform	78,190	94,200	20.5%
Student Support	120,756	126,811	5.0%
Comprehensive Programs	49,598	59,434	19.8%
Educational Technologies	23,270	26,712	14.8%
Dissemination & Tech. Assist.	17,972	17,123	-4.7%
Evaluation	5,174	7,130	37.8%
Other	5,056	5,076	0.4%

Figure 6

Standards and Assessments

For too long the U.S. education system has been based on the idea of minimum competency, a concept that promotes the "dumbing down" of curricula, particularly for certain groups, instead of promoting advanced achievement. To change this approach, the Administration supports efforts to adopt high standards for what all students should know and be able to do. If high standards are used as a gauge of our expectations for all students, the Nation's view of minimum competency will change drastically.

To measure progress toward the achievement of those standards, the CEHR strategy includes support for the development of model assessments for use by States, districts, and schools

FY 1994 Request for Elementary and Secondary Education: by Category

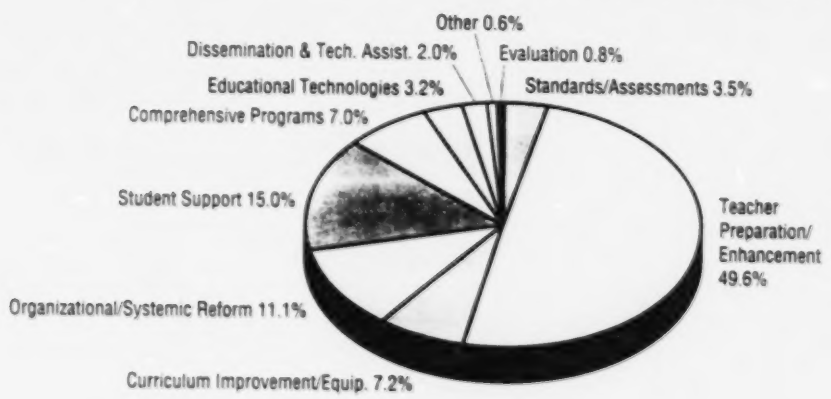


Figure 7

in monitoring individual student progress and the administration of national and international assessments to monitor the progress of our Nation as a whole.

For FY 1994, a total of $30 million is requested for programs that focus on standards and assessments. In addition, $71 million in resources from comprehensive and systemic reform programs support the milestones in this area.

Strategic Plan Objectives and Milestones:

Establishment and implementation of standards in mathematics and science for curriculum, teaching, and assessment. This includes support for the development and adoption of State and local curriculum frameworks and for assessment procedures tied to these standards.

Base Investment: The majority of the funding for standards and assessments supports the Strategic Plan milestones. The base investment for standards and assessments includes studies by NSF on improving science and mathematics indicators, removing barriers to systemic reform, and improving assessment policies and practices. NSF is also mandated by Congress to produce a biennial report on the status of mathematics and science education.

Milestone: By 1994, a set of science standards will have been developed by the National Academy of Sciences (NAS).

Implementation: ED is supporting this effort at $3 million with FY 1991, 1992, and 1993 funds, and NSF is requesting $1.3 million for FY 1994. DOE, HHS, and NASA are also contributing a total of $500,000 in FY 1993 and 1994 for building consensus for these standards.

Milestone: Beginning in 1994, regular assessments of students' performance in mathematics and science will be held.

Implementation: ED will support the administration of a national assessment in science at a cost of $17 million.

Milestone: In 1994 and 1998, international assessments in mathematics and science will be performed.

Implementation: Through their combined efforts, ED and NSF will support this milestone at a cost of $8.5 million in FY 1994. The next international assessment is planned for 1995.

Milestone: Agencies will provide support and incentives for implementation of high standards, such as those developed by the National Council of Teachers of Mathematics (NCTM) for mathematics standards (by 1995) and those being developed by the NAS for science standards (by 1997).

Implementation: All agencies will incorporate these standards into their programs whenever possible. For FY 1994, a total of $68 million is requested for programs specifically designed to implement the standards, including NSF's systemic reform initiatives, both the Statewide Systemic Initiative (SSI) and the Urban Systemic Initiative (estimated contribution—$57 million), which encourage implementation of the standards; continued support by ED for State curriculum frameworks and other systemic reform activities linked to high standards (estimated funding—$11 million); DOE's funding ($300 thousand) for the

Mathematical Sciences Education Board to ensure that DOE projects are consistent with the NCTM standards.

Milestone: By FY 1998, ED will provide support for the development or revision of State curriculum frameworks reflecting challenging standards.

Implementation: In FY 1992 and 1993, ED supported the development of curriculum frameworks in up to 20 States, plus the District of Columbia.

Milestone: By FY 1998, ED and NSF will provide support for the development of model assessments for use by States and others in measuring student performance relative to the standards.

Implementation: NSF is supporting the development of model assessments. For FY 1994, ED is also proposing to support research to develop state-of-the-art assessments tied to high standards.

Teacher Preparation and Enhancement

Skilled and knowledgeable teachers are arguably the most important component of elementary and secondary systemic reform. The CEHR vision of classrooms in the year 2000 has as its centerpiece knowledgeable teachers who inspire and invigorate students in their desire to learn. These teachers should be prepared with a high level of content knowledge and the pedagogical skills to promote students' discovery of this knowledge. The CEHR strategy calls for an updating of the skills of the current workforce and the revision of programs that prepare the educators of tomorrow.

Improving current teachers' skills has traditionally been the area into which the FCCSET/CEHR agencies have placed most of their resources at the elementary and secondary level. The Strategic Plan and the FY 1994 budget submission recognize that both preservice and inservice teacher training must be accompanied by simultaneous reform in other areas including curriculum, assessment, and reform of certification requirements. For FY 1994, $420 million is requested for teacher preparation and enhancement programs. (An additional $17.3 million of Organizational and Systemic Reform funding support these milestones.)

Strategic Plan Objectives and Milestones:

Upgrading the pedagogical and content skills of the existing teaching workforce.

Base Investment: The CEHR strategy recognizes that, although intensive teacher training is a priority, teachers need and benefit from a wide variety of teacher preparation and enhancement activities. Therefore, CEHR also funds programs that support research in the area of teaching, provide teachers with short-term training experiences that provide exposure to new ideas, opportunities to establish networks, or brief training in specific content areas, as well as awards for outstanding teaching. Participating agencies include USDA, DOD, ED, DOE, HHS, DOI, EPA, NASA, NSF, and SI.

Milestones: From 1993 through 1998, a total of 600,000 teachers will receive intensive disciplinary and pedagogical training.

Implementation: Under the budget proposal, approximately 44,000 teachers will receive intensive training at a cost of $194 million. Virtually all agencies will contribute to the achievement of this milestone. ED and NSF will provide the largest portion of support for this milestone. ED's programs that can support intensive training include the Eisenhower State Grant program and the Bilingual Education program. NSF will continue supporting its teacher enhancement program, as well as training teachers through its SSI. The FCCSET Summer Teacher Enhancement Institutes will begin in 1993 under the leadership of DOE with the participation of USDA, DOC, DOI, EPA, NASA, and SI; this effort will provide intensive training to over 800 middle and high school teachers. DOE, NASA and other concerned agencies will continue to provide intensive training and research experiences for over 1300 teachers in the agencies' specific areas of scientific and technical interest.

Reform of the preservice teacher education system.

Base Investment: NSF, EPA, and DOE support the revision of teacher preparation programs following a variety of models at a cost of $9.3 million.

Milestone: By 1996, eight geographically distributed teacher preparation consortia will have been established. By 2000, one-third of all secondary science and mathematics teachers will graduate from schools participating in these programs.

Implementation: At this time, NSF is the primary contributor to this milestone. In 1993, NSF made multiyear awards for three consortia. In 1994, at least five additional consortia will be funded, at a cost of $10.5 million, bringing the total to eight consortia.

Milestone: By 1998, the Federal Government will have provided incentives to encourage States to reform their certification requirements. This will lead to all new elementary teachers being educated in world-class teacher preparation programs.

Implementation: Reform of certification requirements would continue to be supported by both NSF and ED in their SSI and Eisenhower programs, respectively. The resources necessary for implementation of this component are included in the funds reported for implementation of the standards.

Curriculum Improvement and Equipment

With the development of standards and the constant evolution of the body of scientific knowledge, it is vital that mathematics and science curricula at all levels be updated. Curricula must also reflect the latest in research on teaching and learning. The Strategic Plan recognizes that systemic reform of elementary and secondary education requires a comprehensive revision of K-12 curricula. The strategy, therefore, proposes the development of comprehensive models that address the spectrum of elementary and secondary education and that allow students to study challenging material at every grade. For FY 1994, a total of $61 million ($1.5 million of which supports the milestone on educational partnerships) is proposed to expand the base investment and achieve the milestones in this area.

Strategic Plan Objectives and Milestones:

Development of curriculum materials that conform to the standards and that allow all students to receive an effective mathematics and science education at all levels. Materials should also reflect student diversity and incorporate hands-on learning.

Base Investment: The base investment in curriculum support, totalling $27 million for FY 1994, underwrites the development of supplementary materials in the agencies' respective areas of expertise; for example, DOI produces specialized education materials available for use in the National Parks.

Milestone: Beginning in 1993, all federally supported mathematics and science materials should conform to high standards such as the NCTM and the emerging NAS standards.

Implementation: Each agency will require that any materials developed conform to high standards. In addition, existing materials will be evaluated to determine their consistency with the high standards. No budget implications have been determined for FY 1994.

Milestone: By 1997, a comprehensive set of science and mathematics curriculum models will be available.

Implementation: NSF will develop a comprehensive set of general mathematics and science education curriculum models; the FY 1994 cost for this is estimated to be $33 million.

Organizational and Systemic Reform

A systemic approach to educational reform must include the simultaneous reform of all components of education. In addition, because education is the responsibility of a variety of groups and organizations, systemic reform should also establish linkages between the various entities involved in education.

Organizational and systemic reform programs are so broad that they provide both direct and indirect support for most of the Strategic Plan milestones. For example, under NSF's comprehensive Statewide Systemic Initiative (SSI) program, support is provided for the implementation of standards and for the training of both preservice and inservice teachers. These components of the programs are discussed under the relevant milestones. A total of $94 million is requested for organizational and systemic reform programs, $77 million of which contribute directly to the milestones under other priorities.

Base Investment: The NSF Career Access Program for which $17 million is requested takes the systemic approach to increasing opportunities in science and technology for minorities.

Student Support

The most memorable educational experiences for many students are the learning opportunities that they receive in addition to their every day school curricula. For FY 1994, the CEHR request for student support is $127 million.

Base Investment: The base investment in student support includes programs that reward students for outstanding achievement, provide students with research or other enrichment experiences, and

provide supplementary services, such as tutoring, to students who need them. Programs in this area also include "bridging" programs designed to help students make the transition between high school and postsecondary education.

For FY 1994, agencies are placing emphasis on programs specifically for groups underrepresented in mathematics and science. For example, NSF will continue to support its Young Scholars Program, which offers enrichment activities in science, mathematics, and engineering for high-ability secondary school students. NASA's Summer High School Apprentice Research Program (SHARP) and HHS' minority high school student research apprenticeship program, which provide 8-week laboratory apprenticeships to underrepresented minority high school students and teachers, will expand significantly in FY 1994. NSF has also redesigned its Career Access programs to include Summer Science Camps, which provide opportunities for minority students.

Undergraduate: Revitalization

To build on and complement proposed reforms at the elementary and secondary level, the FCCSET/CEHR strategy proposes a revitalization of undergraduate education. The Federal Government currently provides valuable, direct support for students at the undergraduate level. However, certain changes must be made if our Nation is to have a well-informed citizenry and an adequate supply of scientists, mathematicians, and engineers. The Strategic Plan calls for a focus on curriculum revision and faculty enhancement in mathematics and science that supplements ongoing Federal activities. To support the base investment and accomplish the goals and milestones identified in the Strategic Plan, CEHR requests a total of $475 million for undergraduate programs, a 10.8 percent increase above the FY 1993 level.

Undergraduate Growth: FY 1993-1994
(Dollars in thousands)

Category	FY 1993	FY 1994	Increase
Total	$428,443	$474,641	10.8%
Curriculum Improvemt./Equip.	55,404	61,050	10.2%
Faculty Preparation/Enhancemt.	91,506	97,723	6.8%
Organizational/Systemic Reform	24,970	34,980	40.1%
Student Support	106,694	115,470	8.2%
Comprehensive Programs	72,963	86,854	19.0%
Educational Technologies	2,221	2,221	0.0%
Disseminationa& Tech. Assist.	330	330	0.0%
Evaluation	1,990	3,090	55.3%
Other	72,365	72,923	0.8%

Figure 8

Curriculum Improvement and Equipment

The need for undergraduate curricula that reflect the latest scientific research is critical. Not only must information be up to date, but individual subjects should be discussed not as discrete bodies of knowledge that bear no relation to each other, but as parts of an integrated whole. The Strategic Plan, therefore, supports the disciplinary and cross-disciplinary reform of curriculum materials as well as programs that update equipment for colleges and universities. The Strategic Plan emphasizes programs that work at the lower division (the first 2 years) of undergraduate education. NSF is chairing the CEHR working group charged with revitalizing undergraduate education.

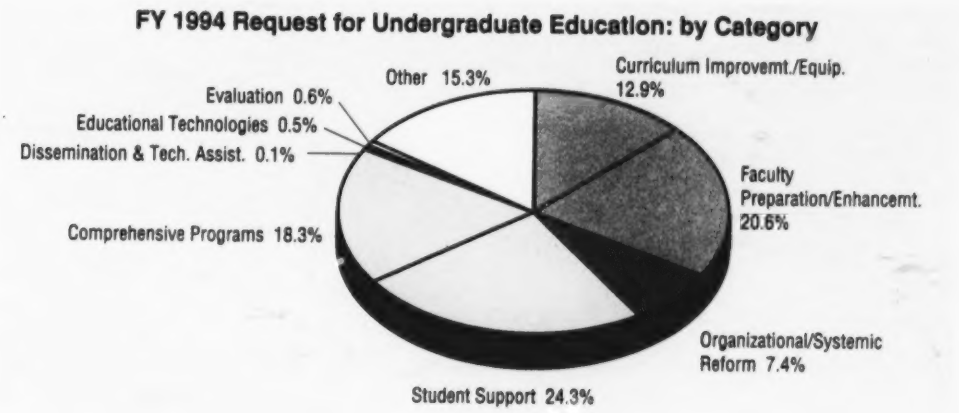


Figure 9

Strategic Plan Objectives and Milestones:

Disciplinary and cross-disciplinary reform of lower-division (freshman and sophomore) curriculum materials.

Base Investment: The base investment in this area supports curriculum and instrumentation programs at the upper levels of undergraduate education at a proposed cost of $16 million for FY 1994. Agencies involved include DOD, DOE, DOI, and NSF. No significant expansion is proposed for the base.

Milestone: By 1995, agencies will have supported activities designed to have one-third of all lower-division students participating in revitalized science, mathematics, and engineering education programs; by 1998, two-thirds of all students will be participating in these activities.

Implementation: NSF is the primary supporter of this activity. $45 million is requested to enable 100,000 lower-division students to participate.

Faculty Preparation and Enhancement

Faculty play a crucial role in undergraduate education, not only as the students' instructors but as their mentors and partners in learning. As such, undergraduate teaching faculty must be kept abreast of the latest scientific and pedagogical research.

Strategic Plan Objectives and Milestones:

Enhancement of teaching faculty to ensure that they are knowledgeable of advances in technology and instrumentation, new experimental methods, and emerging pedagogical techniques.

Base Investment: The base investment in Faculty Preparation and Enhancement supports workshops for faculty and other enhancement experiences that are not related to research. For example, DOE regularly sponsors workshops for undergraduate teaching faculty on the latest developments in scientific research and instrumentation.

Milestone: By 1996, CEHR agencies will provide research-related experiences to at least 16,000 undergraduate mathematics, science, and engineering teaching faculty. By the year 2000, at least 50,000 will have participated.

Implementation: Several agencies, including NSF, NASA, and DOE, provide opportunities for undergraduate teaching faculty to participate in research experiences. To place the agencies on track toward achieving this milestone, the CEHR budget proposal of $22 million provides for the participation of approximately 5000 faculty in research experiences in 1994.

Student Support

The Federal Government provides valuable direct support for students to enable them to continue their education at the postsecondary level with a special emphasis on programs that are designed to increase participation of underrepresented groups. This support takes a variety of forms including scholarships, cooperative and summer work experiences, and bridging experiences between 2-year and 4-year and between 4-year and post-graduate institutions. Bridging experiences between 2-year and 4-year institutions contribute to the Strategic Plan milestones on partnerships. The remainder of the programs are included under the base investment.

Base Investment: With the costs of attending colleges and universities outstripping inflation, it is increasingly important that the Federal Government continue its support for students. It is particularly important that efforts designed to stimulate participation in post-secondary education by groups underrepresented in mathematics and science be maintained. FCCSET/CEHR requests over $110 million to increase the number of students served and, in several cases, the amount of resources each student would receive. This level would also permit the establishment of new programs designed to support underrepresented groups, such as USDA's proposed Minority Scholars Program.

Strategic Plan Objectives and Milestones:

Promote formation and strengthening of partnerships between 2-year institutions and other sectors. Two-year colleges are an important sector of the educational system. Federal programs should foster stronger linkages between 2-year colleges and the elementary, secondary, and upper-division sectors in order to stimulate student enrollment, program articulation, and improved instruction.

Milestone: By 1994, CEHR agencies will expand activities that promote linkages between 2- and 4-year institutions and between 2-year colleges and universities.

Implementation: Several CEHR agencies currently have bridging programs to facilitate linkages between 2-year and 4-year institutions. NASA, HHS, and DOE have designed programs to facilitate the transition between 2-year and 4-year colleges; a total of $7.5 million is requested for these programs (including $1 million from comprehensive programs and $1.5 million from curriculum improvement).

Organizational and Systemic Reform/Comprehensive Programs

Base Investment: Organizational and Systemic Reform programs at the undergraduate level, primarily supported by NSF, are designed to use a systemic approach in addressing two major issues: (1) increasing the participation of underrepresented groups in mathematics and science education; and (2) reforming the undergraduate engineering course of study through support for coalitions of institutions. For FY 1994, a total of $35 million is proposed for these programs.

Similar to the undergraduate organizational and systemic reform programs, the majority of the Comprehensive Programs promote the participation of groups underrepresented in mathematics and science. In addition, USDA also supports two comprehensive, competitive programs that provide grants to improve several aspects of food and agricultural sciences academic programs, including faculty development, curriculum enhancement, student experiential learning, and instruction delivery systems. NSF plans to begin two initiatives focusing on two separate populations—women and persons with disabilities. FY 1994 requests for these programs total $87 million ($1 million of which supports the educational partnerships milestone).

Graduate: Maintaining a World Class Program

The third component in the continuum of education, the graduate education system in the United States, has long been recognized as the best in the world. The Federal Government plays a major role in the financing of graduate education. Maintaining the U.S. graduate system is becoming even more important at a time when our society is becoming increasingly dependent upon scientific and technological advances and, by extension, on an adequate supply of scientists and engineers. USDA is chairing the working group responsible for looking at graduate education and developing a strategy for its ongoing support and improvement.

Graduate Growth: FY 1993-1994
(Dollars in thousands)

Category	FY 1993	FY 1994	Increase
Total	$921,636	$942,988	2.3%
Student Support	596,382	612,954	2.8%
Faculty Development	3,146	3,486	10.8%
Evaluation	464	455	-1.9%
Other	321,644	326,093	1.4%

Figure 10

FY 1994 Request for Graduate Education: by Category

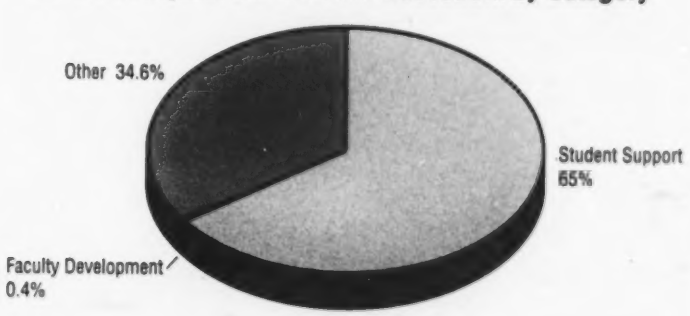


Figure 11

The FCCSET/CEHR Strategic Plan calls for strong continued support for graduate education, requesting $943 million for graduate education activities in 1994, a 2.3 percent increase over the FY 1993 appropriation.

Public Understanding of Science: Lifelong Learning

Learning does not stop with the cessation of formal schooling. If the Nation is to have adults who can make informed decisions on issues of great personal as well as national importance in areas such as the environment, medicine, and technology, people must continue to learn and gain new information throughout their lives. Lifetime learning is a prominent topic in the President's agenda and is also of particular concern to CEHR. The Strategic Plan includes a goal on increasing the public's understanding of science through the establishment of standards for public science literacy and the revision of Federal programs to support those standards. The Plan identifies an intermediate goal of increasing the proportion of scientifically literate adults by 50 percent in FY 1998 based on 1991 data. All of the agencies' existing science literacy programs contribute to the milestones of the Strategic Plan. HHS is chairing the working group that is responsible for Public Understanding of Science (PUNS) issues.

Public Understanding of Science Growth: FY 1993-1994
(Dollars in thousands)

Category	FY 1993	FY 1994	Increase
Total	**$66,542**	**$69,102**	**3.9%**
Decision-Makers	4,420	4,625	5.1%
Media Resources	10,135	9,525	-6.0%
Public Comm.Linked Programs	43,347	47,991	10.7%
Public Information Campaigns	8,335	6,656	-20.1%
Evaluation	305	305	0.0%

Figure 12

The FY 1994 request includes a total of $69 million for public understanding of science programs, a 3.9 percent increase over the 1993 appropriation.

Strategic Plan Objectives and Milestones:

Increasing public understanding of science.

Milestone: In 1994, CEHR will convene a consensus development conference to discuss standards for public science literacy, identify data needs, and propose effective education strategies.

FY 1994 Request for Public Understanding of Science: by Category

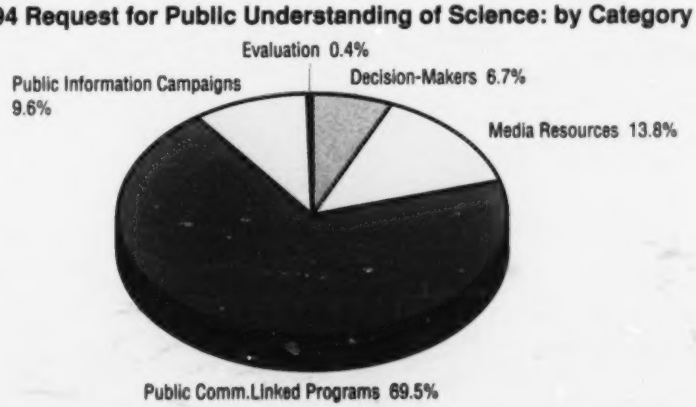


Figure 13

Implementation: HHS is coordinating this effort, which cost $100 thousand in FY 1993 funds. An additional $475 thousand is proposed for FY 1994 to hold follow-up public hearings. Several agencies will contribute to these activities.

Milestone: In 1995, CEHR will identify and adopt science literacy standards.

Implementation: The CEHR working group on PUNS will coordinate these efforts.

Milestone: Beginning in 1996, CEHR agencies will revise and strengthen their programs to contribute to the goal of having the proportion of scientifically literate adults increase by 50 percent in FY 1998 based on 1991 data.

Implementation: Each agency will be responsible for the revision of its science literacy programs. Funds estimated for the evaluation portion of this milestone are shown under the evaluation milestone.

Technology Education: Training for Tomorrow

Ensuring that our Nation is able to compete effectively in the global economy will require workers who not only have a solid formal educational foundation but also have the specific skills and abilities to succeed at their profession. Both new and experienced workers must have access to the training that provides them with opportunities for growth. The CEHR strategy recognizes the importance of programs that facilitate the school-to-work transition of youth who will not be attending college as well as programs that provide accessible and affordable training for the current workforce. Details on these programs will be determined and specific milestones will be developed in 1993 by CEHR.

Crosscutting Priorities Growth: FY 1993-1994
(Dollars in thousands)

Category	FY 1993	FY 1994	Increase
Evaluation	$7,933	$10,980	38.4%
Educational Technologies	25,491	28,933	13.5%
Dissemination/Technical Asst.	18,302	17,453	-4.6%

Figure 14

Crosscutting Issues

In addition to the five segments of the educational continuum, the FCCSET/CEHR Strategic Plan has identified several important issues that span educational levels and program types. Of top importance among these issues, and a Tier I priority in the plan, is the evaluation of Federal programs. The Plan's Tier II Priorities are cross-cutting issues aimed at increasing the participation of all students, e.g.: (1) focusing on the needs of populations that have not always been encouraged to participate in mathematics and science; (2) improving the Federal Government's dissemination mechanisms so that information and model programs are easily accessible; and (3) identifying Federal strategies for the development and implementation of educational technologies.

Evaluation

By placing it as a Tier I priority, the FCCSET/CEHR strategy recognizes that evaluation is the cornerstone of effective program management. It ensures accountability and strengthens programs by identifying areas that need improvement, by identifying successful models, or by

providing suggestions for new directions. The FCCSET/CEHR strategy calls for the development of a strategy, under NSF leadership, for agencies to evaluate their programs.

Milestone: In 1992, CEHR will establish an Evaluation Working Group to coordinate evaluation plans across CEHR agencies, develop procedures, and recommend outcome indicators.

Implementation: All CEHR agencies are represented on this Working Group, chaired by NSF. There are no FY 1994 budget implications.

Milestone: In 1992, CEHR will form an external expert panel to inform CEHR agencies of evaluation needs and make broad assessments of agency programs.

Implementation: The Expert Panel, co-chaired by Karl Pister (University of California) and Mary Budd Rowe (Stanford University), was formed and is presenting its findings in 1993; NSF is supporting this milestone.

Milestone: During 1993-1994, CEHR will assess the capacity of Federal laboratories for teacher enhancement opportunities.

Implementation: In accordance with the milestone, the study will be conducted in FY 1994. The Evaluation Working Group has completed an outline of the strategy to assess Federal laboratories' capacity to conduct teacher enhancement activities and will complete the design for the assessment in FY 1993. The Evaluation Working Group plans to conduct the survey of Federal laboratories' capacity in FY 1994 and proposes evaluating the quality of Federal laboratory teacher enhancement efforts in FY 1995.

Milestones: In 1993, each CEHR agency will complete plans to evaluate its mathematics and science education programs; by 1995, each agency will have completed evaluations of its highest priority programs; by 1998, agencies will have completed and disseminated the results from the first cycle of evaluations.

Implementation: Each agency is responsible for developing a plan to have all of its major programs evaluated by 1998. FCCSET/CEHR has identified $11 million in FY 1994 for the implementation of this milestone, a 38 percent increase over the 1993 level. Additional resources are located within program budgets and cannot be isolated. The CEHR Evaluation Working Group prepared guidelines for agencies to develop their evaluation plans. In the Summer of 1993, the Working Group provided additional technical assistance to the CEHR agencies to develop their evaluation plans.

Restructuring of Programs to Increase the Participation of Underrepresented Groups in Science and Mathematics

Although the establishment and implementation of a universal set of high standards for all students will go far in opening the mathematics and science pipeline at the early grades, there will continue to be a need for programs that are specifically designed to encourage the participation of members of underrepresented groups, including women, minorities, and individuals with disabilities. Current estimates indicate that the Federal Government is spending at least

$225 million on mathematics and science education programs that specifically benefit groups underrepresented in science and mathematics. A strategy must be developed for optimal expenditure of these resources.

Milestone: In 1993, CEHR will define a set of objectives for programs focused on underrepresented groups. CEHR will also develop realistic and widely applicable measures to identify successful programs and exemplary products for these groups.

Implementation: ED is chairing the CEHR working group addressing this issue. There are no budget or programmatic implications.

Milestone: In 1994, CEHR agencies will examine their programs against those measures.

Implementation: Each agency will be responsible for considering its own programs. FY 1994 budget implications are included under the evaluation milestone.

Milestone: In 1995 and beyond, CEHR will develop and implement a coordinated strategy for increasing the participation of underrepresented groups.

Implementation: The budget and programmatic implementations of this milestone will be determined as the strategy is developed.

Dissemination of High-Quality Instructional Material at All Education Levels to Administrators, Faculty, Teachers, and Students

To facilitate the dissemination and adoption of model programs and to increase the availability of a wide range of information, the CEHR recommends the development of a coordinated strategy for dissemination. Dissemination activities should also be accompanied by outreach and technical assistance activities designed to ensure adoption.

Milestone: In 1993, CEHR will develop and put into place a set of quality standards for all materials developed. By 1995, each agency will begin to evaluate its products to ensure that they meet those standards.

Implementation: ED is chairing the CEHR working group responsible for implementation of this goal. No other budget or programmatic efforts are currently needed.

Milestone: From 1993-1998, agencies will actively disseminate high-quality products.

Implementation: For FY 1994, as agencies try to maximize the impact of existing efforts, $17 million is requested for a variety of dissemination efforts. In addition, as a coordinated strategy is developed, individual roles for agencies will be established.

Identification of Federal Strategies to Support the Research and Development, Implementation, and Infrastructure Development for Educational Technologies

With scientific and technological advances occurring so rapidly, traditional aids to learning are no longer adequate. ***Educational technology can become an important learning tool by expanding the walls of the classroom to encompass the world.*** Use of technologies can be particularly valuable in increasing the access of students in remote areas to a wide variety of resources. A total of $29 million is requested for FY 1994 to support activities. Examples include distance learning partnerships aimed at improving mathematics and science instruction; developing networked systems to link schools to scientific resources; developing multimedia curriculum resources; developing applications of virtual reality to education; and developing curriculum applications for high performance computing and communication.

Milestone: In 1993, CEHR agencies will inventory their educational technology-based activities.

Implementation: NASA is chairing the CEHR working group responsible for compiling this information, and each agency will contribute to the achievement of the milestone. There are no budget implications for FY 1994.

Milestone: By 1994, CEHR agencies will significantly increase the number of the Nation's secondary schools that participate in at least one technology-based research project involving working relationships with the scientific community.

Implementation: Agencies will develop activities contributing to this milestone in coordination with the CEHR Educational Technologies Working Group.

Milestone: By 1994, CEHR will have developed and communicated a national vision for networked resources. In 1995, agencies will sponsor educational technology activities that reflect this vision.

Implementation: The working group will be responsible for the development of this plan. Budget and programmatic impacts will be determined as the plan is developed.

Future Activities

Since the CEHR Strategic Plan is not a static document, it will be revised and updated on an annual basis. In 1993, CEHR will reevaluate the 5-year strategy. The CEHR working groups will investigate their areas of responsibility, assess progress toward accomplishment of the goals and milestones of the FY 1994 Strategic Plan, and prepare and update the goals and milestones.

The FY 1995 Strategic Plan will examine the area of technology education. Building on the work done by the technical education group in 1992 and 1993, the FY 1995 Plan will address CEHR's role in ensuring that the Nation will have an adequate and well-trained technical workforce. Issues to be addressed include the relationship between education and work critical to the needs of an increasingly technical workforce; the provision of adequate and appropriate technical education that prepares young people to find and retain jobs in the workforce of today and tomorrow; the provision of adequate and appropriate technical education and training needed over a lifetime; and identification of actions that would enable the Nation to retain its world leadership position in science and technology. In conducting its activities, the CEHR will be guided by the National Education Goals and by activities being undertaken by the Administration to restructure the way our schools and businesses prepare and maintain a competent, qualified technical workforce.

In 1993 and beyond, CEHR will also continue to expand linkages or partnerships—among agencies, between Government and business, and between informal and formal educational activities— to assist in achieving and supporting systemic educational change. These partnerships are extremely important as CEHR attempts to assist the reform of mathematics and science education within the context of broader educational reform designed to address the National Education Goals and Goals 2000.

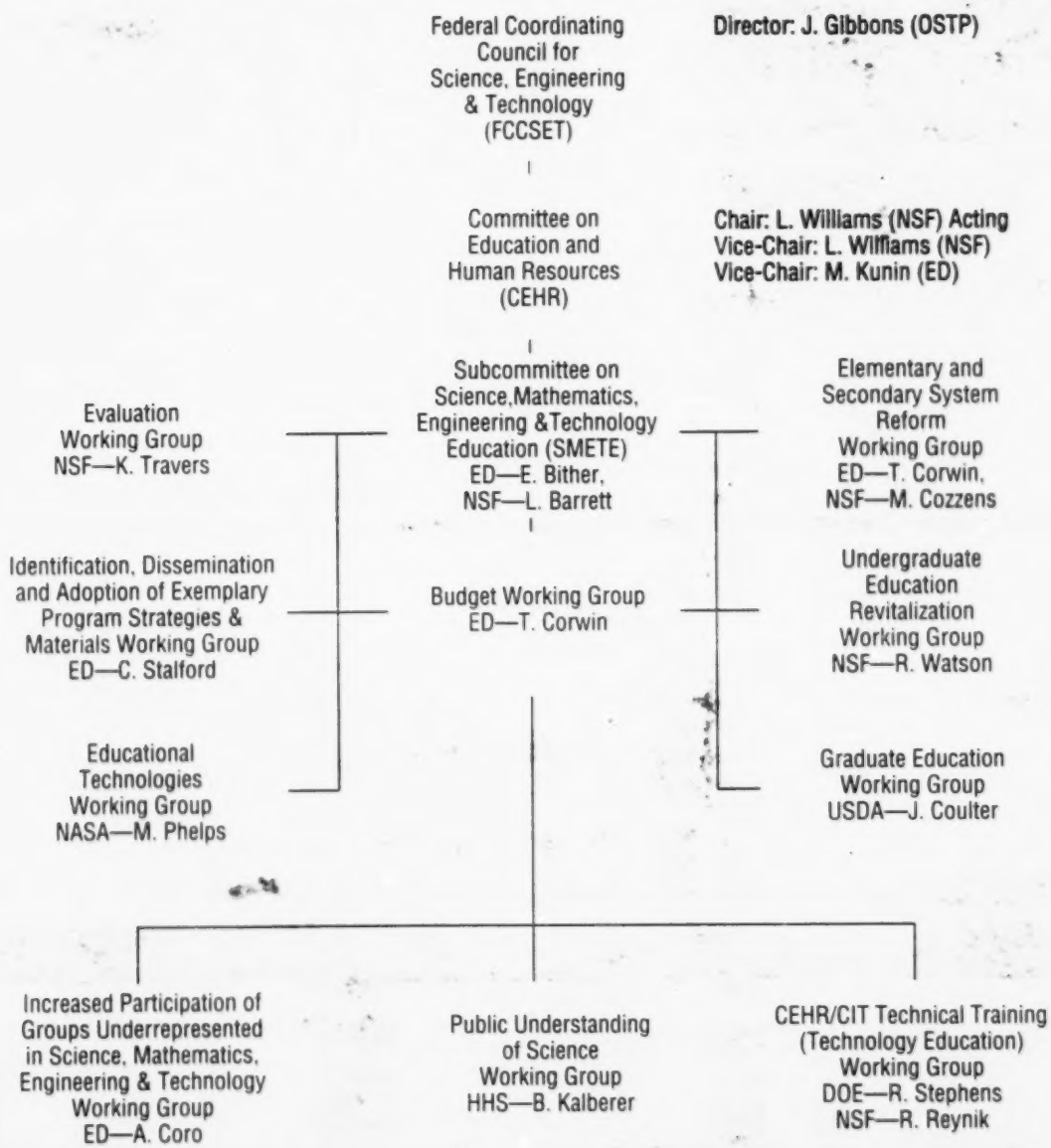
Conclusion

As a comprehensive agenda for the reform of mathematics and science education, the FCCSET/CEHR Strategic Plan and accompanying budget present an approach designed to maximize the impact of current programs and to use more effectively the individual strengths of each agency. Each agency has an integral role and each agency's contribution collectively is stronger than the individual sum of its parts.

This strategy embodies a solid commitment to improving education that recognizes both the short- and long-term investments needed to make lasting fundamental changes in our education system and to achieve our National Education Goals related to mathematics and science. Support for this strategy, both programmatic and budgetary, will help move our Nation into the 21st century and demonstrate a true commitment to investing in our future.

Appendix 1

Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) Commitee on Education and Human Resources (CEHR) Management Structure


Federal Coordinating Council for Science, Engineering & Technology (FCCSET)
Director: J. Gibbons (OSTP)
Committee on Education and Human Resources (CEHR)
Chair: L. Williams (NSF) Acting
Vice-Chair: L. Williams (NSF)
Vice-Chair: M. Kunin (ED)
Subcommittee on Science,Mathematics, Engineering &Technology Education (SMETE)
ED—E. Bither,
NSF—L. Barrett
Evaluation Working Group
NSF—K. Travers
Elementary and Secondary System Reform Working Group
ED—T. Corwin,
NSF—M. Cozzens
Identification, Dissemination and Adoption of Exemplary Program Strategies & Materials Working Group
ED—C. Stalford
Budget Working Group
ED—T. Corwin
Undergraduate Education Revitalization Working Group
NSF—R. Watson
Educational Technologies Working Group
NASA—M. Phelps
Graduate Education Working Group
USDA—J. Coulter
Increased Participation of Groups Underrepresented in Science, Mathematics, Engineering & Technology Working Group
ED—A. Coro
Public Understanding of Science Working Group
HHS—B. Kalberer
CEHR/CIT Technical Training (Technology Education) Working Group
DOE—R. Stephens
NSF—R. Reynik

Appendix 2

Federal Coordinating Council on Science, Engineering, and Technology

Committee on Education and Human Resources

Subcommittee on Science, Mathematics, Engineering, and Technology Education

Working Group Chairs

Elementary and Secondary Education Systemic Reform
Margaret Cozzens, National Science Foundation
Thomas Corwin, Department of Education

Undergraduate Education Revitalization
Robert Watson, National Science Foundation

Graduate Education
K. Jane Coulter, Department of Agriculture

Public Understanding of Science
Bonnie Kalberer, Department of Health and Human Services\

Joint CEHR/CIT Working Group on Technical Education (Technology Education)
Richard Stephens, Department of Energy
Robert Revnik, National Science Foundation

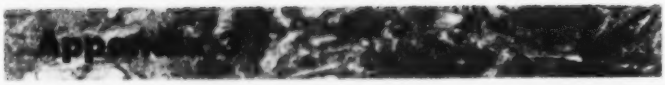
Evaluation of Federal Agency Programs
Kenneth Travers, National Science Foundation

Increased Participation of Groups Underrepresented in Science, Mathematics, Engineering, and Technology
Alicia Coro, Department of Education

Identification, Dissemination, and Adoption of Exemplary Program Strategies and Materials
Charles Stalford, Department of Education

Educational Technologies
Malcom Phelps, National Aeronautics and Space Administration

Budget
Thomas Corwin, Department of Education



FCCSET/CEHR FY 1994 Budget Working Group

Program Definitions

Budget Categorization

Category 1: Programs (1) appropriated by Congress expressly for science, mathematics, and engineering and technology education or for science literacy or (2) funded under agency research (or other) accounts but expressly managed by the agency as science, mathematics, engineering, and technology education or science literacy activities.

Category 2: Programs funded under research (or other) accounts that contribute to science, mathematics, engineering and technology education or science literacy but do not fall under Category 1. Example: Undergraduate and graduate students supported under research grants.

Category 3: Science, mathematics, and engineering education or science literacy activities supported as an integral part of more generic programs. Examples: DOD and DOI Federal schools, ED Chapter 1 and Chapter 2 formula grant programs, science or technology training supported under the DOL Job Training Partnership Act.

General Definitions

Elementary and Secondary (Pre K-12): Science, mathematics, and technology programs directed at any or all of the following levels: preschool, elementary, middle, and high school. Preservice and inservice training for pre K-12 teachers, even if such training is received at an institution of higher education.

Undergraduate: Science, mathematics, engineering, and technology programs directed at issues that affect students below the baccalaureate level but beyond secondary school. Relevant institutions include 2-year colleges, 4-year colleges, and comprehensive and graduate institutions offering baccalaureate degrees.

Graduate: Science, mathematics, engineering, and technology programs focused on post-baccalaureate education and training. Non-degree and post-doctoral training programs are included.

Teacher: Pre K-12 educator.

Faculty: Postsecondary educator.

Public Understanding of Science: Programs specifically focused on increasing public understanding and knowledge of science and technology and its impact on society. These programs educate adults about the principles underlying scientific methods and processes. Programs promoting changing behavior (i.e. public information, consumer education, health promotion and disease prevention) without offering specific and detailed information on the science behind the changes are not included.

Underrepresented Groups: Those groups whose proportional representation in science, mathematics, engineering, and technology is less than their proportional representation in the population as a whole. These groups include: some ethnic minorities (e.g., American Indians, Alaskan Natives, Blacks (not of Hispanic origin), Hispanics, Asians (in some disciplines), and Pacific Islanders); females; persons with disabilities; the limited-English proficient; and the economically disadvantaged.

Definitions of Program Elements

Standards and Assessment:

Standards: Programs that support the development or implementation of curriculum, teaching, and assessment standards for mathematics and science including the development of curriculum frameworks.

Assessment: Programs that support the development, establishment, or administration of assessments at the local, State or national level.

Teacher and Faculty Preparation:

Programs targeted on preservice preparation (disciplinary and pedagogical) for instruction in mathematics, science, engineering, and technology. Programs that are purely pedagogical in nature are not included.

Teacher and Faculty Enhancement:

Inservice programs that update skills as well as enrich and strengthen the theoretical and practical basis for classroom and laboratory instruction. Programs that are purely pedagogical in nature or that primarily benefit research faculty are not included.

Teacher and Faculty Recognition:

Programs designed to reward teachers and faculty for noteworthy achievement in mathematics, science, engineering, and technology education.

Curriculum Development and Equipment:

Curriculum development: Programs that support the development or implementation of new and improved courses, curricula, and instructional materials in mathematics, science, and engineering.

Equipment: Programs that support the purchase, updating, or improvement of equipment, including textbooks, laboratory equipment, and hardware and software.

Organization/Systemic Reform:

Programs designed to make changes in all aspects of an educational system, including teachers, curricula, and administrative practices. These program primarily involve collaborative efforts among the various parties that have a vested interest in mathematics, science, and engineering education (e.g., legislative and education officials, schools, higher education institutions, the research establishment, business and industry, professional organizations, community groups). Organization and operational reform applies to both the pre K-12 and postsecondary levels; systemic reform is applicable primarily to the pre K-12 level.

Student Support:

Pre K-12:

Student Recognition: Programs that reward and recognize outstanding student achievement in mathematics, science, and engineering.

Enrichment Experiences: Programs that provide students with mathematics and science-related experiences, outside of the normal school day, i.e., summer laboratory experiences.

Direct services: Services provided to students, within the context of formal education, designed to improve their achievement in mathematics and science.

Bridging to Postsecondary: Programs to facilitate the transition from high school to postsecondary education. These programs usually have the goal of retaining student's interest in mathematics and science.

Undergraduate:

Financial Assistance: Monetary support provided to enable students to pursue a course of study in mathematics, science, and engineering-related fields, including the field of mathematics and science education.

Research Experiences and Co-ops: Programs that support the participation of undergraduate students in research experiences, as well as cooperative experiences in business and industry.

Bridging to 4-year and Post-graduate: Programs to facilitate student's transition to 4-year institutions and post-graduate programs.

Graduate:

Pre- and Post-doctoral Fellowships: Grants made to individuals to support pre- or post-doctoral study or work.

Pre- and Post-doctoral Traineeships: Grants made to institutions for pre- and post-doctoral student support.

Comprehensive Programs:

Programs that simultaneously address different components of education (e.g., curriculum/materials, teacher/faculty enhancement, community involvement).

Educational Technologies:

Research and Development: Programs that support research and development on the application of advanced technologies to education.

Implementation: Activities that utilize technology in the provision of educational services, e.g., teacher training, distance learning, curriculum efforts.

Infrastructure: Programs that support the establishment of a technology-based infrastructure, including institutional and organizational arrangements, policies, networks (e.g., NREN, SMARTLINE), computing equipment and instrumentation, software tools, information bases, curriculum materials, teaching strategies, and the expertise of teachers and educational researchers.

Dissemination and Technical Assistance:

Programs and activities that encourage the widespread dissemination, exchange, and use of knowledge, materials, and practices to improve mathematics, science, and engineering education. Includes support for activities and programs that provide technical assistance to educators in the adoption and utilization of new products or educational programs.

Program Evaluation:

Programs and activities designed to generate data and analyses that provide information on the operation of an agency's mathematics, science, and engineering education programs. Relevant activities include development of data bases for monitoring project performance and related evaluation and assessment studies that indicate the effectiveness of projects or entire programs in meeting stated goals and objectives.

Other:

Encompasses activities not appropriate for inclusion under any of the other categories.

FCCSET/CEHR FY 1992 Appropriations

(dollars times 1000)

Major Categories/Elements	Total Request	USDA	DOC	DOD	ED	DOE	HHS	DOI	EPA	NASA	NSF	SI
Total Federal Funds Requested	$ 1,997,368	23,577	4,557	422,966	312,150	108,800	442,587	82,540	8,300	77,473	504,350	10,070
Pre K - 12	**$ 704,593**	**1,231**	**0**	**12,134**	**301,320**	**24,778**	**20,027**	**20,770**	**6,500**	**17,984**	**299,200**	**650**
Standard/Assessment	$ 21,020	0	0	0	16,700	0	0	0	0	0	4,320	0
A. Standards	$ 0	0	0	0	0	0	0	0	0	0	0	0
B.Assessment	$ 21,020	0	0	0	16,700	0	0	0	0	0	4,320	0
Teacher Prep./Enhancement	$ 390,784	208	0	941	240,000	3,520	4,233	1,950	2,389	5,624	131,660	260
A. Teacher Preparation	$ 15,012	0	0	0	0	400	0	0	1,592	0	13,020	0
B. Teacher Enhancement	$ 363,761	208	0	0	240,000	3,120	4,233	1,950	796	5,624	107,570	260
C. Teacher Recognition	$ 4,240	0	0	0	0	0	0	0	0	0	4,240	0
Curriculum Improvment & Equip.	$ 55,960	500	0	318	0	1,510	1,202	3,390	2,470	5,370	41,040	160
A. Curriculum Improvement	$ 51,382	500	0	0	0	1,360	1,202	150	2,470	4,500	41,040	160
B. Equipment	$ 950	0	0	0	0	150	0	0	0	800	0	0
Org. & Systemic Reform	$ 61,550	0	0	0	0	0	0	0	0	0	61,550	0
Student Support	$ 91,315	500	0	10,876	14,620	10,582	10,116	13,890	40	1,972	28,720	0
A. Student Recognition	$ 60	0	0	0	0	0	0	20	40	0	0	0
B. Enrichment Experience	$ 0	0	0	0	0	0	0	0	0	0	0	0
C. Direct Services	$ 1,844	0	0	1,844	0	0	0	0	0	0	0	0
D. Bridging to Postsecondary	$ 15,353	500	0	0	14,620	200	0	0	0	33	0	0
Comprehensive Programs	$ 40,715	0	0	0	12,500	8,330	4,477	870	0	2,318	12,070	150
Education Technologies	$ 15,845	0	0	0	0	0	0	0	125	2,700	13,020	0
Dissemination & Tech. Assist.	$ 18,800	0	0	0	15,500	170	0	0	0	0	3,050	80
Program Evaluation	$ 4,609	23	0	0	0	666	0	150	0	0	3,770	0
Other	$ 3,996	0	0	0	2,000	0	0	520	1,476	0	0	0
Undergraduate 2-year	**$ 21,113**	**0**	**0**	**0**	**0**	**3,617**	**3,355**	**100**	**0**	**1,676**	**12,365**	**0**
Curriculum Improvemt. & Equip.	$ 10,750	0	0	0	0	2,946	0	0	0	0	7,804	0
A. Curriculum Development	$ 10,500	0	0	0	0	2,946	0	0	0	0	7,554	0
B. Equipment	$ 0	0	0	0	0	0	0	0	0	0	0	0
Faculty Prep./Enhancement	$ 2,581	0	0	0	0	0	0	20	0	0	2,561	0
A. Faculty Preparation	$ 0	0	0	0	0	0	0	0	0	0	0	0
B. Faculty Enhancement	$ 2,581	0	0	0	0	0	0	20	0	0	2,561	0
C. Faculty Recognition	$ 0	0	0	0	0	0	0	0	0	0	0	0
Org. & Systemic Reform	$ 2,000	0	0	0	0	0	0	0	0	0	2,000	0
Student Support	$ 1,936	0	0	0	0	630	800	80	0	426	0	0
A. Financial Assistance	$ 630	0	0	0	0	630	0	0	0	0	0	0
B. Research Experiences & Coops	$ 80	0	0	0	0	0	0	80	0	0	0	0
C. Bridging Graduate Education	$ 800	0	0	0	0	0	800	0	0	0	0	0
Comprehensive Programs	$ 3,805	0	0	0	0	0	2,555	0	0	1,250	0	0
Educational Technologies	$ 0	0	0	0	0	0	0	0	0	0	0	0
Dissemination & Tech. Assist.	$ 0	0	0	0	0	0	0	0	0	0	0	0
Program Evaluation	$ 41	0	0	0	0	41	0	0	0	0	0	0
Undergraduate 4-year	**$ 382,402**	**13,639**	**0**	**132,291**	**10,500**	**52,604**	**24,242**	**8,190**	**800**	**23,171**	**116,835**	**130**
Curriculum Developmt. & Equip.	$ 46,054	668	0	2,080	0	570	0	1,010	0	0	41,726	0
A. Curriculum Development	$ 43,404	668	0	0	0	0	0	1,010	0	0	41,726	0
B. Equipment	$ 2,650	0	0	2,080	0	570	0	0	0	0	0	0
Faculty Prep./Enhancement	$ 84,679	0	0	42,323	0	11,357	1,310	1,820	0	4,000	23,869	0
A. Faculty Preparation	$ 5,645	0	0	0	0	5,645	0	0	0	0	0	0
B. Faculty Enhancement	$ 32,716	0	0	5	0	5,712	1,310	1,820	0	0	23,869	0
C. Faculty Recognition	$ 0	0	0	0	0	0	0	0	0	0	0	0
Org. & Systemic Reform	$ 16,100	0	0	0	0	0	0	0	0	100	16,000	0
Student Support	$ 94,347	0	0	23,662	4,500	17,177	4,007	4,820	800	19,071	20,180	130
A. Financial Assistance	$ 9,629	0	0	0	4,500	3,735	0	0	200	1,194	0	0
B. Research Experiences & Coops	$ 52,572	0	0	3,897	0	13,442	4,007	4,820	600	5,626	20,180	0
C. Bridging Graduate Education	$ 0	0	0	0	0	0	0	0	0	0	0	0
Comprehensive Programs	$ 69,577	11,750	0	802	6,000	22,000	18,925	540	0	0	9,560	0
Educational Technologies	$ 2,221	1,221	0	0	0	0	0	0	0	0	1,000	0
Dissemination & Tech. Assist.	$ 510	0	0	0	0	0	0	0	0	0	510	0
Program Evaluation	$ 1,860	0	0	0	0	0	0	0	0	0	1,860	0
Other	$ 67,053	0	0	63,423	0	1,500	0	0	0	0	2,130	0
Graduate	**$ 824,886**	**8,707**	**4,557**	**278,541**	**0**	**23,386**	**392,563**	**10,970**	**1,000**	**34,642**	**70,020**	**500**
Student Support	$ 588,765	8,677	4,557	56,278	0	20,656	387,299	10,970	1,000	32,948	65,880	500
A. Predoctural Fellowships	$ 75,125	0	300	0	0	5,856	8,849	7750	0	0	52,370	0
B. Postdoctoral Fellowships	$ 78,254	0	4,257	0	0	8,550	53,887	0	0	0	11,560	0
C. Predoctoral Traineeships	$ 5,450	3,500	0	0	0	0	0	0	0	0	1,950	0
D. Postdoctoral Traineeships	$ 169,142	5,177	0	0	0	700	163,265	0	0	0	0	0
Faculty Development	$ 2,519	0	0	175	0	0	650	0	0	1,694	0	0
Program Evaluation	$ 566	30	0	436	0	100	0	0	0	0	0	0
Other	$ 233,035	0	0	221,651	0	2,630	4,614	0	0	0	4,140	0
Public Understanding of Science	**$ 64,375**	**0**	**0**	**0**	**330**	**4,415**	**2,400**	**42,510**	**0**	**0**	**5,930**	**8,790**
Decision-Makers	$ 4,840	0	0	0	0	70	0	3,320	0	0	1,450	0
Media Resources	$ 9,935	0	0	0	0	2,105	250	3,100	0	0	4,480	0
Public/Comm. Linked Programs	$ 42,076	0	0	0	0	1,020	1,846	30,420	0	0	0	8,790
Pubic Information Campaigns	$ 7,120	0	0	0	330	1,120	0	5670	0	0	0	0
Program Evaluation	$ 404	0	0	0	0	100	304	0	0	0	0	0

FCCSET/CEHR FY 1993 Appropriations

(dollars times 1000)

Major Categories/Elements	Total Request	USDA	DOC	DOD	ED	DOE	HHS	DOI	EPA	NASA	NSF	SI
Total Federal Funds Requested	$ 2,186,236	24,365	5,200	526,718	340,932	102,108	464,107	86,010	9,025	79,844	537,870	10,057
Pre K - 12	$ **769,616**	**1,208**	**0**	**24,859**	**328,075**	**27,347**	**26,977**	**23,060**	**7,115**	**20,498**	**309,760**	**717**
Standard/Assessment	$ 19,480	0	0	0	14,950	0	0	0	0	0	4,530	0
A. Standards	$ 0	0	0	0	0	0	0	0	0	0	0	0
B. Assessment	$ 19,480	0	0	0	14,950	0	0	0	0	0	4,530	0
Teacher Prep./Enhancement	$ 395,333	208	0	961	248,289	7,050	3,965	1,880	1,910	7,651	123,090	329
A. Teacher Preparation	$ 13,790	0	0	0	0	0	0	0	880	0	12,910	0
B. Teacher Enhancement	$ 369,082	208	0	0	248,289	7,050	3,965	1,880	880	7,651	98,830	329
C. Teacher Recognition	$ 4,300	0	0	0	0	0	0	0	150	0	4,150	0
Curriculum Improvemt. & Equip.	$ 54,787	500	0	408	0	1,370	872	4,850	2,500	4,448	39,680	159
A. Curriculum Improvement	$ 48,623	500	0	0	0	1,220	872	150	2,500	3,542	39,680	159
B. Equipment	$ 990	0	0	0	0	150	0	0	0	840	0	0
Org. & Systemic Reform	$ 78,190	0	0	0	0	0	0	0	0	0	78,190	0
Student Support	$ 120,756	500	0	23,490	32,674	8,850	9,705	14,880	60	1,687	28,910	0
A. Student Recognition	$ 80	0	0	0	0	0	0	20	60	0	0	0
B. Enrichment Experience	$ 0	0	0	0	0	0	0	0	0	0	0	0
C. Direct Services	$ 19,992	0	0	1,918	18,074	0	0	0	0	0	0	0
D. Bridging to Postsecondary	$ 15,333	500	0	0	14,600	200	0	0	0	33	0	0
Comprehensive Programs	$ 49,598	0	0	0	12,100	9,163	12,435	770	669	2,112	12,200	149
Education Technologies	$ 23,270	0	0	0	0	0	0	0	150	4,600	18,520	0
Dissemination & Tech. Assist.	$ 17,972	0	0	0	17,062	170	0	0	0	0	660	80
Program Evaluation	$ 5,174	0	0	0	300	744	0	150	0	0	3,980	0
Other	$ 5,056	0	0	0	2,700	0	0	530	1,826	0	0	0
Undergraduate 2-year	$ **24,585**	**0**	**0**	**0**	**0**	**1,873**	**7,660**	**100**	**0**	**1,442**	**13,510**	**0**
Curriculum Improvemt. & Equip.	$ 9,283	0	0	0	0	1,473	0	0	0	0	7,810	0
A. Curriculum Development	$ 9,033	0	0	0	0	1,473	0	0	0	0	7,560	0
B. Equipment	$ 0	0	0	0	0	0	0	0	0	0	0	0
Faculty Prep./Enhancement	$ 3,020	0	0	0	0	0	0	20	0	0	3,000	0
A. Faculty Preparation	$ 0	0	0	0	0	0	0	0	0	0	0	0
B. Faculty Enhancement	$ 3,020	0	0	0	0	0	0	20	0	0	3,000	0
C. Faculty Recognition	$ 0	0	0	0	0	0	0	0	0	0	0	0
Org. & Systemic Reform	$ 2,700	0	0	0	0	0	0	0	0	0	2,700	0
Student Support	$ 5,922	0	0	0	0	400	5,000	80	0	442	0	0
A. Financial Assistance	$ 400	0	0	0	0	400	0	0	0	0	0	0
B. Research Exp. & Coops	$ 80	0	0	0	0	0	0	80	0	0	0	0
C. Bridging Graduate Education	$ 5,000	0	0	0	0	0	5,000	0	0	0	0	0
Comprehensive Programs	$ 3,660	0	0	0	0	0	2,660	0	0	1,000	0	0
Educational Technologies	$ 0	0	0	0	0	0	0	0	0	0	0	0
Dissemination & Tech. Assist.	$ 0	0	0	0	0	0	0	0	0	0	0	0
Program Evaluation	$ 0	0	0	0	0	0	0	0	0	0	0	0
Undergraduate 4-year	$ **403,857**	**13,639**	**0**	**140,219**	**12,517**	**50,225**	**25,622**	**7,780**	**910**	**23,386**	**129,430**	**129**
Curriculum Develop. & Equip.	$ 46,121	668	0	2,163	0	570	0	600	0	0	42,120	0
A. Curriculum Development	$ 43,388	668	0	0	0	0	0	600	0	0	42,120	0
B. Equipment	$ 2,733	0	0	2,163	0	570	0	0	0	0	0	0
Faculty Prep./Enhancement	$ 88,486	0	0	44,076	0	9,162	1,338	1,800	50	3,900	28,160	0
A. Faculty Preparation	$ 3,900	0	0	0	0	3,900	0	0	0	0	0	0
B. Faculty Enhancement	$ 36,616	0	0	6	0	5,262	1,338	1,800	50	0	28,160	0
C. Faculty Recognition	$ 0	0	0	0	0	0	0	0	0	0	0	
Org. & Systemic Reform	$ 22,270	0	0	0	0	0	0	0	0	100	22,170	0
Student Support	$ 100,772	0	0	24,574	6,625	17,133	5,555	4,840	860	19,386	21,670	129
A. Financial Assistance	$ 12,009	0	0	0	6,625	3,845	0	0	200	1,339	0	0
B. Research Exper. & Coops	$ 55,160	0	0	4,053	0	13,288	5,012	4,840	660	5,637	21,670	0
C. Bridging Graduate Education	$ 0	0	0	0	0	0	0	0	0	0	0	0
Comprehensive Programs	$ 69,303	11,750	0	802	5,892	21,860	18,729	540	0	0	9,730	0
Educational Technologies	$ 2,221	1,221	0	0	0	0	0	0	0	0	1,000	0
Dissemination & Tech. Assist.	$ 330	0	0	0	0	0	0	0	0	0	330	0
Program Evaluation	$ 1,990	0	0	0	0	0	0	0	0	0	1,990	0
Other	$ 72,365	0	0	68,605	0	1,500	0	0	0	0	2,260	0
Graduate	$ **921,636**	**9,518**	**5,200**	**361,640**	**0**	**17,537**	**401,767**	**10,820**	**1,000**	**34,518**	**79,140**	**496**
Student Support	$ 596,382	9,500	5,200	50,429	0	15,797	395,672	10,820	1,000	32,618	74,850	496
A. Predoctoral Fellowships	$ 78,892	0	300	0	0	5,397	13,235	7,770	0	0	52,190	0
B. Postdoctoral Fellowships	$ 80,019	0	4,900	0	0	6,550	54,909	0	0	0	13,660	0
C. Predoctoral Traineeships	$ 12,500	3,500	0	0	0	0	0	0	0	0	9,000	0
D. Postdoctoral Traineeships	$ 172,280	6,000	0	0	0	1,500	164,780	0	0	0	0	0
Faculty Development	$ 3,146	0	0	175	0	0	1,071	0	0	1,900	0	0
Program Evaluation	$ 464	18	0	446	0	0	0	0	0	0	0	0
Other	$ 321,644	0	0	310,590	0	1,740	5,024	0	0	0	4,290	0
Public Understanding of Science	$ **66,542**	**0**	**0**	**0**	**340**	**5,126**	**2,081**	**44,250**	**0**	**0**	**6,030**	**8,715**
Decision-Makers	$ 4,420	0	0	0	0	70	0	3,200	0	0	1,150	0
Media Resources	$ 10,135	0	0	0	0	2,105	0	3,150	0	0	4,880	0
Public/Comm. Linked Programs	$ 43,347	0	0	0	0	96	1,776	32,760	0	0	0	8,715
Public Information Campaigns	$ 8,335	0	0	0	340	2,855	0	5,140	0	0	0	0
Program Evaluation	$ 305	0	0	0	0	0	305	0	0	0	0	0

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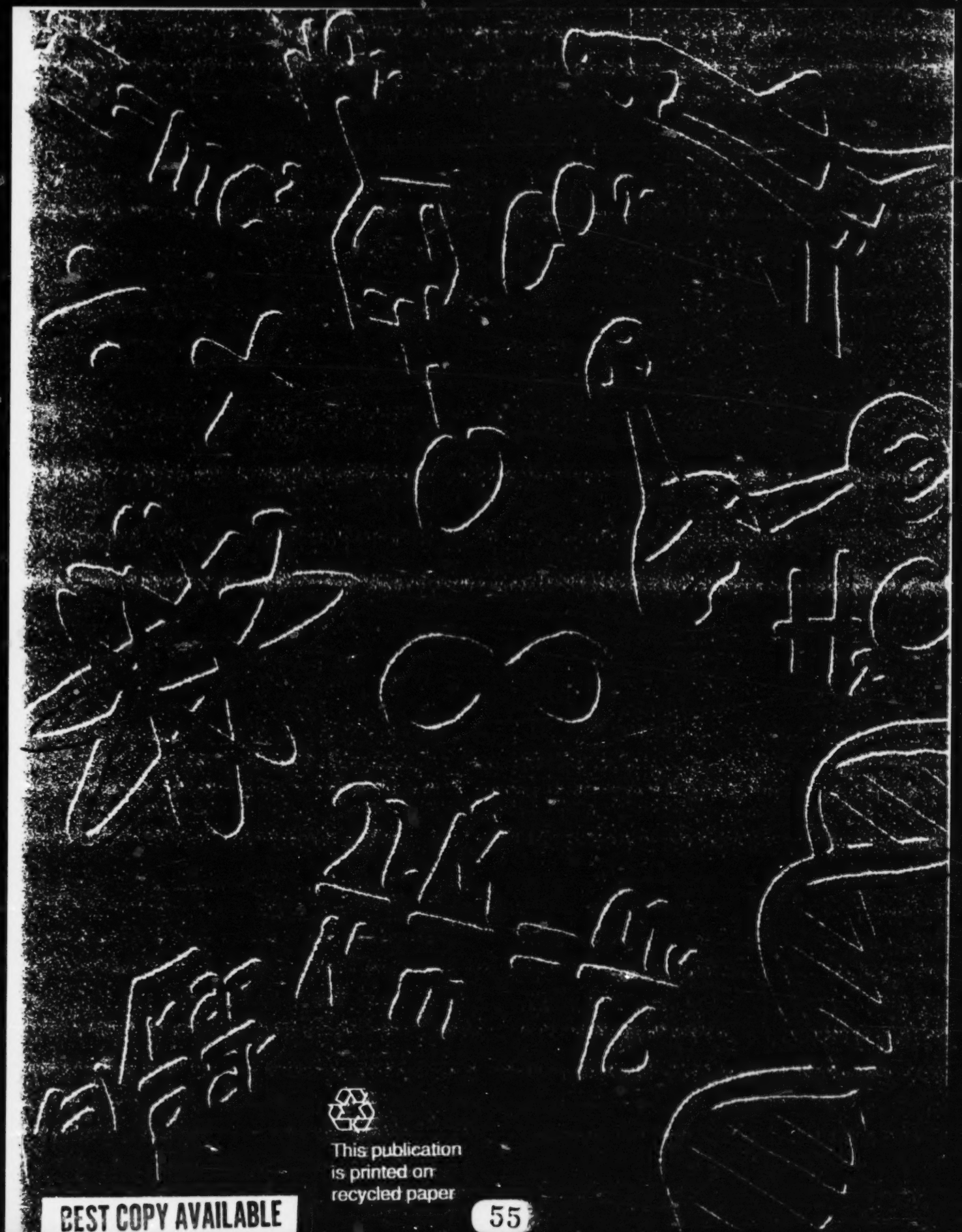
FCCSET/CEHR 1994 Request

(dollars times 1000)

Major Categories/Elements	Total Request	USDA	DOC	DOD	ED	DOE	HHS	DOI	EPA	NASA	NSF	SI
Total Federal Funds Requested	$ 2,334,237	24,041	6,200	539,395	355,939	128,499	464,108	90,013	9,855	84,251	621,880	10,057
Pre K - 12	$ 847,506	723	0	26,135	343,649	45,409	26,977	23,446	7,945	19,146	353,360	717
Standard/Assessment	$ 29,961	0	0	0	24,131	0	0	0	0	0	5,830	0
A. Standards	$ 1,300	0	0	0	0	0	0	0	0	0	1,300	0
B. Assessment	$ 28,661	0	0	0	24,131	0	0	0	0	0	4,530	0
Teacher Prep./Enhancement	$ 419,988	216	0	992	254,931	15,108	3,965	2,380	2,175	7,782	132,110	329
A. Teacher Preparation	$ 19,817	0	0	0	0	400	0	0	1,007	0	18,410	0
B. Teacher Enhancement	$ 387,618	216	0	0	254,931	14,708	3,965	2,380	1,007	7,782	102,300	329
C. Teacher Recognition	$ 4,361	0	0	0	0	0	0	0	161	0	4,200	0
Curriculum Improvemt. & Equip.	$ 61,071	0	0	408	0	2,396	872	4,840	3,061	5,385	43,950	159
A. Curriculum Improvement	$ 54,866	0	0	0	0	2,246	872	150	3,061	4,428	43,950	159
B. Equipment	$ 1,030	0	0	0	0	150	0	0	0	880	0	0
Org. & Systemic Reform	$ 94,200	0	0	0	0	0	0	0	0	0	94,200	0
Student Support	$ 126,811	507	0	24,735	32,674	12,116	9,705	14,950	60	2,705	29,360	0
A. Student Recognition	$ 80	0	0	0	0	0	0	20	60	0	0	0
B. enrichment Experience	$ 0	0	0	0	0	0	0	0	0	0	0	0
C. Direct Services	$ 20,730	0	0	2,226	18,074	430	0	0	0	0	0	0
D. Bridging to Postsecondary	$ 15,343	507	0	0	14,600	200	0	0	0	36	0	0
Comprehensive Programs	$ 59,434	0	0	0	12,100	13,077	12,435	640	1,209	1,774	18,050	149
Education Technologies	$ 26,712	0	0	0	0	1,842	0	0	150	1,500	23,220	0
Dissemination & Tech. Assist.	$ 17,123	0	0	0	16,213	170	0	0	0	0	660	80
Program Evaluation	$ 7,130	0	0	0	300	700	0	150	0	0	5,980	0
Other	$ 5,076	0	0	0	3,300	0	0	486	1,290	0	0	0
Undergraduate 2-year	$ 25,976	0	0	0	0	1,573	7,660	100	0	1,463	15,180	0
Curriculum Improvemt. & Equip.	$ 9,353	0	0	0	0	1,473	0	0	0	0	7,880	0
A. Curriculum Development	$ 9,033	0	0	0	0	1,473	0	0	0	0	7,560	0
B. Equipment	$ 0	0	0	0	0	0	0	0	0	0	0	0
Faculty Prep./Enhancement	$ 3,020	0	0	0	0	0	0	20	0	0	3,000	0
A. Faculty Preparation	$ 0	0	0	0	0	0	0	0	0	0	0	0
B. Faculty Enhancement	$ 3,020	0	0	0	0	0	0	20	0	0	3,000	0
C. Faculty Recognition	$ 0	0	0	0	0	0	0	0	0	0	0	0
Org. & Systemic Reform	$ 4,300	0	0	0	0	0	0	0	0	0	4,300	0
Student Support	$ 5,543	0	0	0	0	0	5,000	80	0	463	0	0
A. Financial Assistance	$ 0	0	0	0	0	0	0	0	0	0	0	0
B. Research Experiences & Coops	$ 80	0	0	0	0	0	0	80	0	0	0	0
C. Bridging Graduate Education	$ 5,000	0	0	0	0	0	5,000	0	0	0	0	0
Comprehensive Programs	$ 3,660	0	0	0	0	0	2,660	0	0	1,000	0	0
Educational Technologies	$ 0	0	0	0	0	0	0	0	0	0	0	0
Dissemination & Tech. Assist.	$ 0	0	0	0	0	0	0	0	0	0	0	0
Program Evaluation	$ 100	0	0	0	0	100	0	0	0	0	0	0
Undergraduate 4-year	$ 448,665	15,263	0	144,660	11,940	56,855	25,622	7,722	910	26,594	158,970	129
Curriculum Dev. & Equip.	$ 51,697	0	0	2,337	0	1,010	0	600	0	0	47,750	0
A. Curriculum Development	$ 48,790	0	0	0	0	440	0	600	0	0	47,750	0
B. Equipment	$ 2,907	0	0	2,337	0	570	0	0	0	0	0	0
Faculty Prep./Enhancement	$ 94,703	0	0	47,532	0	9,201	1,338	1,802	50	4,100	30,680	0
A. Faculty Preparation	$ 3,920	0	0	0	0	3,920	0	0	0	0	0	0
B. Faculty Enhancement	$ 39,157	0	0	6	0	5,281	1,338	1,802	50	0	30,680	0
C. Faculty Recognition	$ 0	0	0	0	0	0	0	0	0	0	0	0
Org. & Systemic Reform	$ 30,680	0	0	0	0	0	0	0	0	110	30,570	0
Student Support	$ 109,927	1,000	0	24,826	6,048	19,065	5,555	4,890	860	22,384	25,170	129
A. Financial Assistance	$ 12,440	1,000	0	0	6,048	3,435	0	0	200	1,757	0	0
B. Research Experiences & Coops	$ 62,945	0	0	4,053	0	15,630	5,012	4,890	660	7,530	25,170	0
C. Bridging Graduate Education	$ 0	0	0	0	0	0	0	0	0	0	0	0
Comprehensive Programs	$ 83,194	13,0420	0	802	5,892	26,079	18,729	430	0	0	18,220	0
Educational Technologies	$ 2,221	1,221	0	0	0	0	0	0	0	0	1,000	0
Dissemination & Tech. Assist.	$ 330	0	0	0	0	0	0	0	0	0	330	0
Program Evaluation	$ 2,990	0	0	0	0	0	0	0	0	0	2,990	0
Other	$ 72,923	0	0	69,163	0	1,500	0	0	0	0	2,260	0
Graduate	$ 942,989	8,055	6,200	368,601	0	19,111	401,768	12,370	1,000	37,048	88,340	496
Student Support	$ 612,954	8,055	6,200	57,980	0	17,323	395,672	12,370	1,000	34,808	79,050	496
A. Predoctoral Fellowships	$ 80,502	0	300	0	0	5,477	13,235	9,300	0	0	52,190	0
B. Postdoctoral Fellowships	$ 81,249	0	5,900	0	0	6,980	54,909	0	0	0	13,460	0
C. Predoctoral Traineeships	$ 16,997	3,597	0	0	0	0	0	0	0	0	13,400	0
D. Postdoctoral Traineeships	$ 171,738	4,458	0	0	0	2,500	164,780	0	0	0	0	0
Faculty Development	$ 3,486	0	0	175	0	0	1,071	0	0	2,240	0	0
Program Evaluation	$ 455	0	0	455	0	0	0	0	0	0	0	0
Other	$ 326,093	0	0	309,990	0	1,788	5,025	0	0	0	9,290	0
Public Understanding of Science	$ 69,102	0	0	0	350	5,551	2,081	46,375	0	0	6,030	8,715
Decision-Makers	$ 4,645	0	0	0	0	70	0	3,405	0	0	1,150	0
Media Resources	$ 9,525	0	0	0	0	1,525	0	3,120	0	0	4,880	0
Public/Comm. Linked Programs	$ 47,991	0	0	0	0	1,020	1,776	36,480	0	0	0	8,715
Public Information Campaigns	$ 6,656	0	0	0	350	2,936	0	3,370	0	0	0	0
Program Evaluation	$ 305	0	0	0	0	0	305	0	0	0	0	0



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U.S. Science, Mathematics, Engineering, and Technology Education FY 1994 Budget Summary

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